NOVEMBER • 194

# TOOL & DIE JOURNAL

TOOLING and PRODUCTION

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Allegheny Ludlum High Speed Drill Rod in these specially-processed smaller sizes is available to you in all types of High Speed Steels, as well as high carbon-high chrome Die Steel types. You can get the *grade* you're used to, plus better results—why not investigate its possibilities?

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A-L now *hot-draws* these small sizes by a special process, instead of cold-drawing with its repeated passes and anneals—each of which takes something out of the steel. The result is: a high degree of hardness, obtained with fine grain size, and with small, evenly distributed carbides for keen cutting edges; plus maximum toughness in the hardened and tempered condition.

By actual test, ⅛" *hot drawn* High Speed Drill Rod at 64 Rockwell C is as much as 18% *tougher* than cold drawn at the same hardness. ● But the best test is to *try* this Drill Rod—*prove* its merits for yourself. Check with your local Allegheny Ludlum Branch Office or distributor.

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**STEEL CORPORATION**
**Pittsburgh, Pa.**

**TOOL STEEL DIVISION: DUNKIRK, N. Y.**

*Fine Tool Steels Since 1854*

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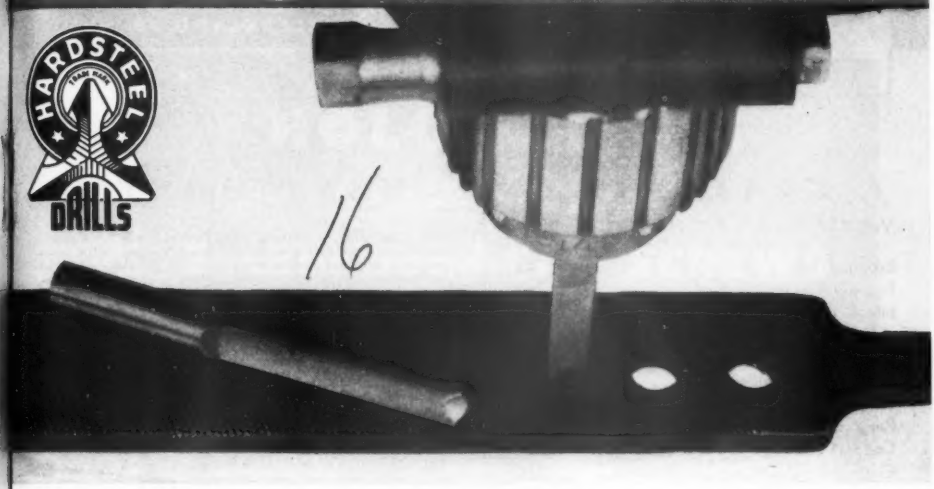
W&D 1778-B

# Drill Hardened Steels *without Annealing* with "HARDSTEEL"




Don't let anyone tell you that hardened steels must be annealed before drilling, countersinking, counterboring or reaming.

With "HARDSTEEL" drills you can produce accurate, smooth holes in steels hardened by any process—oil-hardened, water hardened, cyanided, nitrided, and they work equally well on work-hardening steels and high carbon-high chrome steels of any degree of hardness.

"HARDSTEEL" drills used with standard drill presses cut costs in production shops because parts drilled after hardening always match at assembly. In service shops they save time and material and permit engineering changes calling for additional drilling to be made after parts are full hardened.

Write for a copy of the "HARDSTEEL" Operators Manual showing how "HARDSTEEL" drills are now functioning in thousands of plants in parts recovery operations.

***You Harden It—We'll Drill It—with "HARDSTEEL"***

**"HARDSTEEL" Tool bits make faster, deeper cuts on steels and non-ferrous alloys.**

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**1368 East 222nd Street • CLEVELAND 17, OHIO**

# "HARDSTEEL"

DRILLS • TOOL BITS • SPECIALS

# TOOL & DIE JOURNAL

TOOLING AND PRODUCTION

1975 LEE ROAD
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*Tool & Die Journal is published monthly for plant operating and purchasing executives and department heads in 48 types of end product and contract manufacturing companies, and is directed to them individually. Rate of subscription to others, including Schools, Libraries and Individuals, $4.00 per year. Single copies fifty cents.*

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## NEXT MONTH

**"Plastics Jigs, Fixtures and Press Tools".** Coincidental with today's greatly increased tooling costs, outstanding progress has been made in the development and application of plastics tooling. New materials and new methods are available to industry for the building of relatively light weight and strong jigs and fixtures and which are applicable to the drawing and forming of heavier stock than heretofore workable with plastics tools. This article is the first of several destined to bring to the reader the latest know-how in plastics tooling.

**"Die Design for Symmetrical Brackets"**, Part III, by Hans Effgen, M.E., Globe Tool & Gage Works, Boston, Mass. Continuing from our November issue, Mr. Effgen concludes his series by describing the construction of a die which produces a bracket with bends in two directions, the bends being made simultaneously. A short discussion will also be given on what is considered good practice in the construction and manufacture of dies, which should be of great interest to the young designer.

**"Mechanized, 100% Inspection".** On the other side of the fence from the practitioners of Quality Control by statistical methods (inspection of batches or samples) are those advocates of 100% inspection. This article explores the mechanization and electronification of inspection operations whereby, at a rate of thousands of indications per hour, 100% inspection can keep pace with production.

**"Measuring Tapers".** A unique indicator-gage design for the measuring of tapered shanks with which the grinder operator can duplicate, and check, piece after piece within the specified tolerance, using only a master taper plug to recheck an indicator reading at occasional intervals.

**"Jig and Fixture Design".** The several operations to be performed on an intricate workpiece are "tooled-up" in this second TDJ "How Would You Tool This Part?" contest article.

•

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*Production Machines, Tools and Accessories. Toolroom Equipment. Measuring Tools and Gages.*

**New Literature**
*Catalogs, Pamphlets, Data.*


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## Socket Head CAP SCREWS

They've GOT to be stronger!
Holo-Krome Socket Head Cap Screws are completely cold forged without drilling, broaching or machining. The H-K patented process of manufacture flows the fibres in a continuous unbroken line from end to end. Completely cold forging not only preserves the inherent strength of the steel, but actually increases the strength at the vital points of a Socket Cap Screw.
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REDUCE OPERATOR HOURS UP TO 90%

INCREASE PRODUCTION As Much As 300%

# DICKERMAN AUTOMATIC DIE FEEDS ARE DOING IT DAILY!

Stop wasting time by hand feeding or using worn or obsolete punch press feeds. The modern Dickerman Die feeds may be attached to any press in any required position. They will accurately feed any Metal, Paper, Fibre, Rubber or Plastic. Through the increased PROFITS they assure you, they pay for themselves in short order. Their moderate cost will amaze you. Rugged construction . . . no wearing parts. Many styles and sizes.

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Produces more Swiss Files in more shapes, and in more sizes, than any other company in the world ....
Sold thru leading supply houses
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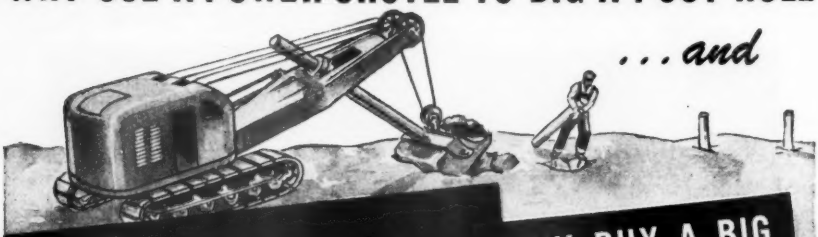
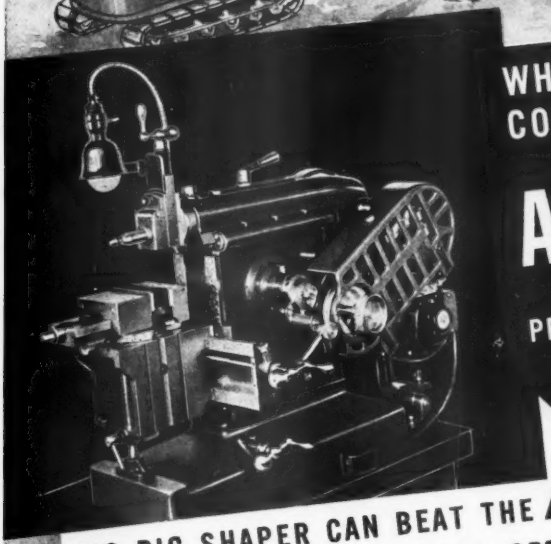
# WHY USE A POWER SHOVEL TO DIG A POST HOLE

*. . . and*





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# TIMKEN GRAPHITIC TOOL STEELS RESPOND UNIFORMLY TO HEAT TREATMENT

## ONE OF FIVE BIG REASONS WHY TIMKEN® GRAPHITIC TOOL STEELS MAKE BETTER TOOLS, DIES, AND GAGES

THE excellent response to heat treatment of Timken® graphitic tool steels has solved many problems found in heat treating ordinary tool steels.

Cracking of thin-walled sections after quenching has often been eliminated by the use of Timken graphitic tool steels. Grinding operations have been substantially cut. Hardness quality has been improved.

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Because of the presence of free graphite and diamond-hard carbides in their structure, they have excellent machinability . . . remarkable resistance to wear and abrasion . . . exceptional non-seizing qualities. And they have amazing structural stability.

Timken graphitic tool steels are made in five analyses, each with its specific advantages: Graph-Al, Graph-Tung, Graph-Sil, Graph-M.N.S., and Graph-Mo.

For help from our Technical Staff in testing Timken graphitic tool steels for your product, write us today. Ask also for our 48-page, fact-packed booklet, "Timken Graphitic Tool Steels". The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

*Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing.*



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10

Because they are the hardest dressing sticks made, NORBIDE* sticks dress tool wheels quickly, efficiently—and have extremely long service life. Small ($\frac{1}{8}$"x$\frac{1}{2}$"x3"), lightweight and easy to use, NORBIDE dressing sticks are perfect for tool wheels 10" and smaller, especially cup and saucer shapes. They are low heat conductors and therefore will not burn the hand.

NORBIDE dressing sticks were first introduced to the trade two years ago. Such long service have they given that the original sticks are still being used in many plants. NORBIDE dressing sticks are molded, without bond, from Norton Boron Carbide—"the hardest material made by man". For further information write to:

*Reg. Trade-mark

**NORTON COMPANY · WORCESTER 6, MASS.**




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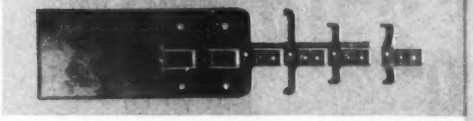
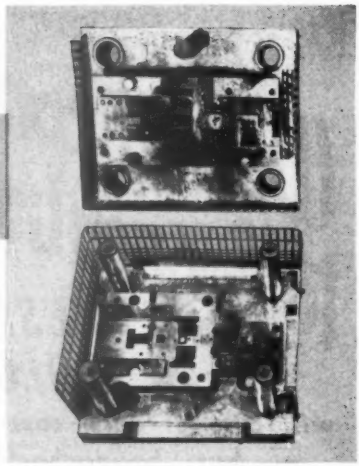
# Averages 122,500 Pieces per grind





# ...using DANLY Precision Die Set

## 6-station progressive die setup speeds production of complex brackets

**save time** | USE DANLY NATION-WIDE DIE SET ASSEMBLY SERVICE

Assembly plants (marked with stars) stock interchangeable parts for quick assembly and delivery of any standard die set to your specifications.

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- **Rochester 4,** 16 Commercial St.

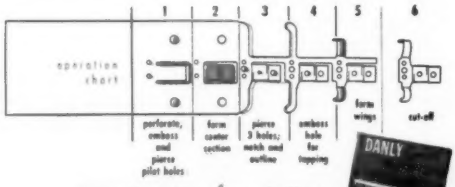
### Danly Engineering Service...

Helpful engineering service will be rendered gladly without obligation. Call on the convenient Danly branch office nearest you. Whether you require close precision or the maintenance of ordinary tolerances, you will find there is a Danly Die Set available to suit your needs in any size, standard or special, for any type of press operation.

The profitable application of progressive dies as a means to speed production and cut stamping costs is illustrated by this die setup. Operating costs are held to a minimum by the maintenance of close punch and die relationship. On a run of over 735 thousand mounting brackets, an average of 122,500 pieces has been obtained per grind. To assure accurate setups and precision operating results, a Danly 4-post precision steel die set is used.

### Tolerance of ± .003" held on hole centers

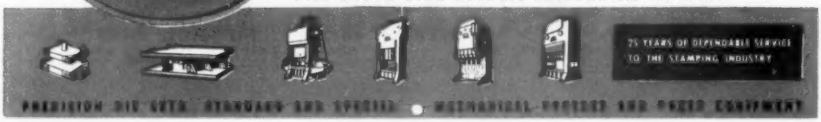
The bracket is produced from 2½" by .042" AISI-1008 steel strip at a rate of 7152 pieces per hour. A tolerance of ± .003" is held between the center lines of the two pierced holes and the one embossed hole. The hole sizes are held to ± .005".



### Write for this *free* bulletin

Illustrates how you can use Danly's machining service to save additional time and money on special die sets.

**DANLY MACHINE SPECIALTIES, INC.**
2100 SOUTH 52ND AVENUE, CHICAGO 50, ILLINOIS


75 YEARS OF DEPENDABLE SERVICE TO THE STAMPING INDUSTRY
PRECISION DIE SETS, STANDARD AND SPECIAL • MECHANICAL PRESSES AND PRESS EQUIPMENT

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## THESE NEW COLONIALS

**will cut not only costs and time but "headaches" too**

## here are four reasons-

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PIONEERS OF H.S.S. BROACHING

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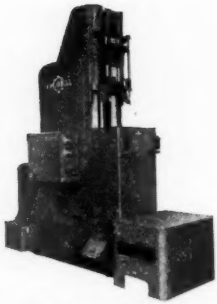
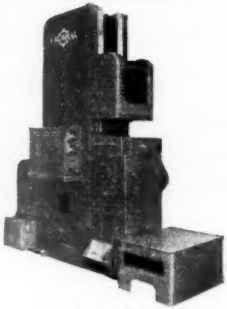


THE PULL-DOWNS

Bulletin RD-48



THE PULL-UPS

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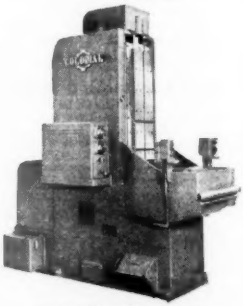

THE SINGLE RAMS

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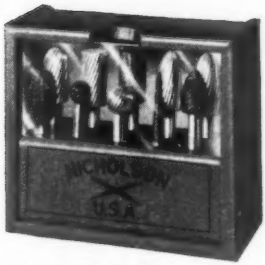
## *make neat presentations to "honor" men*




**STANDARD KIT No. 40**
***5 Burs and 5 Files with 1/4" shank.***

**STANDARD KIT No. 88**
***18 Burs with 1/8" shank.***
OTHER ASSORTMENTS AVAILABLE

With an eye toward building employee good will, many industrial managements make a practice of extending "token recognition" for outstanding service. A kit of Nicholson Rotary Files or Burs makes a fine personal gratuity.

From the following available stocks, your industrial distributor can supply such kits in various standard or special assortments.

**HIGH SPEED STEEL — 1/4" SHANK — *Hand Cut Rotary Files*** (used principally on ferrous metals and any scaly, tough, dense surface) come in 16 standard shapes and 3 degrees of coarseness. *Ground-from-Solid Burs* (used principally for non-ferrous metals and other soft materials) come in 16 standard shapes and 3 degrees of coarseness.

**CARBIDE — 1/4" SHANK — *Ground Bur*** type only. Made in 9 standard shapes and 3 degrees of coarseness. With up to 100 times the wearing qualities of high-speed steel, Carbide Burs are used principally on long production runs. These Carbides will also cut efficiently on materials such as hardened tool steel.

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*(In Canada, Port Hope, Ont.)*

**NICHOLSON ROTARY FILES** NICHOLSON U.S.A.
**HAND CUT AND MACHINE GROUND • HIGH SPEED STEEL AND CARBIDE**



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# NEW BENCHMASTER

## DEEP THROAT 4 TON punch press

● Here's the press you need for punching large sheet steel and other stock in a jiffy. Its deep throat gives extra capacity—now enables punching to the center of a 17½" circle! Extra sturdy frame is heavily reinforced at all stress points. Press weighs 340 lbs.!

The new Benchmaster retains all the quality, engineering advantages and proven performance features of the standard model—yet gives you CAPACITY seldom encountered in larger presses! Available as a bench model or with legs as a standard extra. *Write for bulletin giving complete details.*

benchmaster MANUFACTURING COMPANY
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benchmaster tools

WORLD'S LARGEST PRODUCER OF SMALL PUNCH PRESSES




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# "CARRY ON"

THE LIFE of any business is like a relay race. The business leader is the runner . . . when his race is run, he passes the baton to his team-mate and the race goes on.

☆ Sound businesses are not tied to the life span of any one leader, they "carry on" no matter what individual may pass from the field. Basic is the rule that there must be another ready to grasp the baton.

☆ K. R. Wilson . . . the founder of this business has passed away. Within the organization he built are others who have come up to take his place. They will "carry on."

☆ The founder's monument — built over a period of thirty-two years — is the successful business he left as a small contribution to America's future. Mute testimony of this fact can be seen in the many thousands of KRW Hydraulic Presses being profitably operated by Industry today.

☆ Raised in these sound traditions, those who will carry on pledge to maintain the same high standards of quality, engineering and manufacture which they inherited. That, to us, is the best way we know to say good-bye to "The Boss."

*The Management Group*

**K·R·WILSON**

WORLD'S LARGEST MANUFACTURER OF GARAGE TOOLS AND EQUIPMENT
215 MAIN STREET . . . BUFFALO 3, N. Y.



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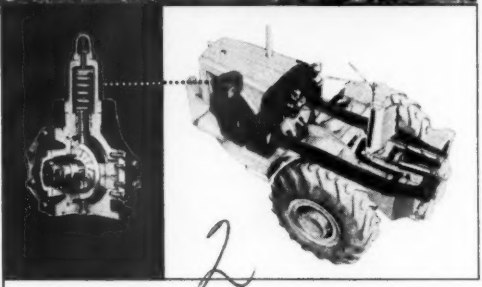
# POWER PLUS For Hydraulic Steering

*Photos courtesy The Heil Company Milwaukee, Wisc.*

The Heil Company's big, heavy duty Heiliner, 2-wheel, high speed tractor shown above, utilizes hydraulic steering. The complete unit, consisting of tractor and scraper, when loaded weighs 45 tons. The power is supplied by a Variable Volume Special RACINE Pump, modified to provide easy handling of this giant earth mover. Note photo to right—pump is engine driven.

Variable Volume RACINE Pumps, provide a source of hydraulic force with these advantages—simplified circuits—reduced number of needed valves — lower horsepower consumption. On many installations, smaller oil reservoirs may be used because heating is reduced.

Trained hydraulic engineers and a well qualified staff of special field representatives offer you a complete consulting service without cost or obligation. Write today for our catalog P-10-C, illustrating RACINE'S full line of Variable Volume Pumps, Sleeve Type Valves and Pressure Boosters. Address RACINE TOOL AND MACHINE CO., 1778 State St., Racine, Wisconsin.

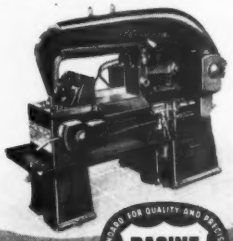


## RACINE *Hydraulic* FOUR-WAY VALVES

A complete line of sleeve-type, balanced-piston four-way oil hydraulic valves in $\frac{3}{8}$" to $1\frac{1}{2}$" I.P.S. are available for your hydraulic circuits. Models can be supplied for either manual, electrical or mechanical control.

## RACINE *Hydraulic* METAL CUTTING MACHINES

The modern, most accurate, time and metal saving way to cut any metal whether it be soft aluminum tubing or hard tool steels is with a RACINE SAW. Saw blade is operated and controlled by "oil-cushioned" hydraulic power. Models are available for general all-around shop work or for high production multiple billet cutting—in all price ranges in capacities from 6" x 6" to 20" x 20". Write for Catalog No. 12.



RACINE

FOR QUALITY AND PRECISION



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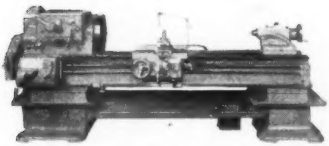
# SPRINGFIELD

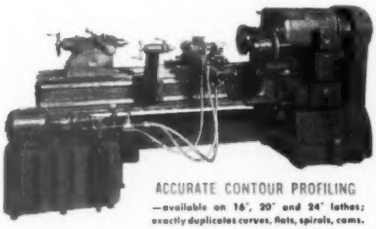
## *Geared Head* LATHES

Springfield builds a complete line of precision, high quality, geared head lathes. Every type of lathe built by Springfield is especially designed and constructed to meet all the requirements of modern tooling, and to retain extreme accuracy through many years of full capacity production.

Write for catalogs and detailed specifications.

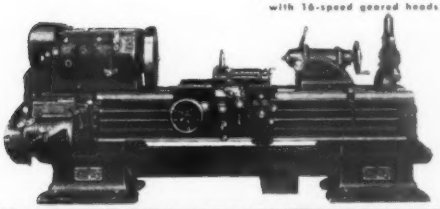


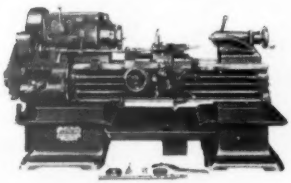
MANUFACTURING LATHE
—with unusually wide applications; capable of accurately turning, boring and facing.



ACCURATE CONTOUR PROFILING
—available on 16", 20" and 24" lathes; exactly duplicates curves, flats, spirals, cams.

SUPER DUTY LATHES
—made in 20" and 22" sizes; equipped with 16-speed geared heads.





TOOL ROOM LATHES
—made in all sizes including 24"; equipped with lead screw reversing mechanisms.

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SPRINGFIELD, OHIO, U. S. A.
GENERAL DISTRIBUTORS: BRYANT MACHINERY & ENGINEERING COMPANY, 400 WEST MADISON ST., CHICAGO 6
*Exclusive Representatives in All Principal Cities*

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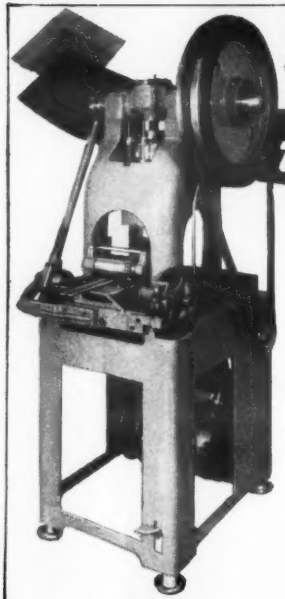
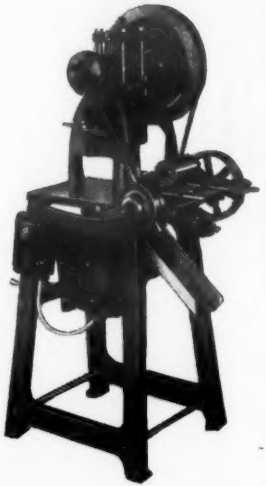
# DIEBEL HI-SPEED AUTOMATIC PRESSES



12 TON PRESS
65-300 STROKES
PER MINUTE

5 TON PRESS
180-550 STROKES
PER MINUTE



**DEPENDABLE SERVICE**
**INCREASED PRODUCTION**
**EFFICIENT PERFORMANCE**
**BUILT-IN AUTOMATIC FEED**
**ECONOMICAL TO OPERATE**
**LOW INITIAL COST**

Twelve ton press equipped with single stroke operation clutch.

Presses are available with a double system of feeding with a set of rollers front and rear.

Diebel presses are employed with ferrous and nonferrous metals, fiber, plastics, rubber, and paper.

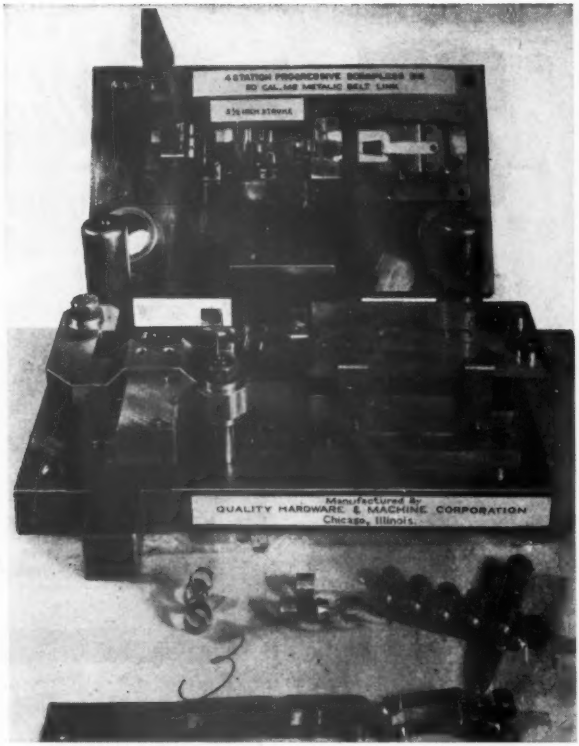
*Complete details will be provided promptly on request.*

**DI MACHINE CORP.**
2708 IRVING PARK ROAD • CHICAGO 18, ILLINOIS

# LOWER COSTS . . . INCREASED PRODUCTION

with

# PLANNED TOOLING



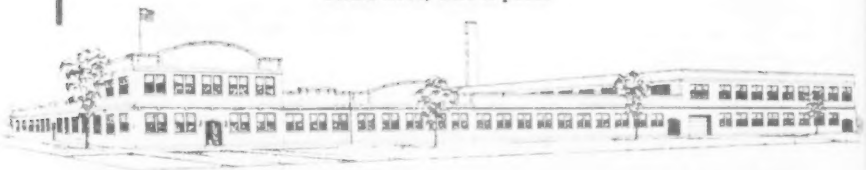

## QUALITY . . .

*has done it for many others, and can do it for you.*

*Permanent Tools* for high production
*Quick Process Tools* for short runs

**Complete tooling, engineered, built and assembled for your presses, with Automatic Feeds, and thoroughly tried out, ready to set up in your plant for economical production**

***Please write, wire or phone***



# QUALITY HARDWARE AND MACHINE DIV.

**CONTINENTAL-UNITED INDUSTRIES CO., INC.**

**5847 North Ravenswood Avenue** **Chicago 26, Illinois**

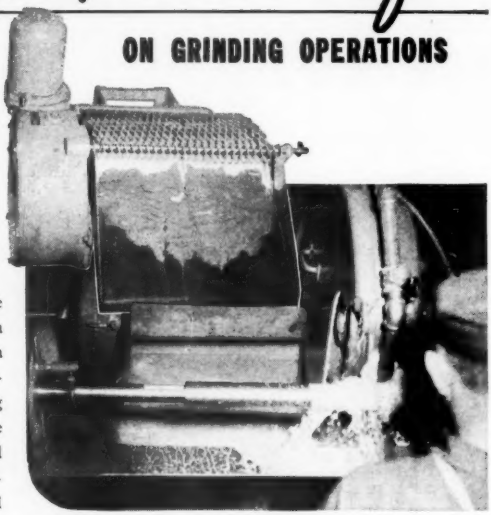
# 25% Longer Wheel Life

## ON GRINDING OPERATIONS

*using*

**BARNESDRIL**
**AUTOMATIC**
**COOLANT**
**SEPARATOR**

**Example: Norton Grinder**



Savings of 25% in wheel life at today's cost levels are a worthwhile investment on any production grinding operation. Add to this a saving of 10 hours a month machine down-time for cleaning and a real cut is made in production costs. These are actual results obtained when a **BARNESDRIL** Automatic Coolant Separator was installed on a Norton Grinder, shown above.

Precision, highly finished surfaces are required on the job to meet inspection tolerances. Accumulated grit and fine chips cause the wheel to load up frequently, and often produce rejects due to scratches. Now, all abrasive particles and fine chips are continuously and automatically removed as the used coolant passes through the Separator. Finish is greatly improved, and the machine requires cleaning only once every six weeks.

**BARNESDRIL** Automatic Coolant Separators are available in capacities ranging from 5 to 100 gallons per minute. They automatically solve finish and clean-out problems in an easy and economical way. Why not ask your **BARNESDRIL** representative for a quotation today?

*Send for a copy of Bulletin B151F*

**BARNES DRILL CO.**

842 CHESTNUT STREET ROCKFORD ILLINOIS U.S.A.



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## *Made Easy!*

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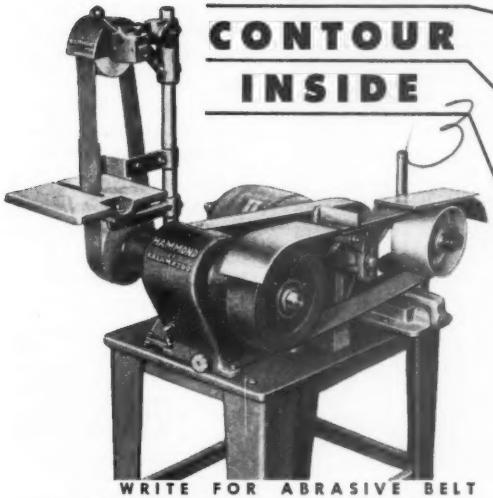
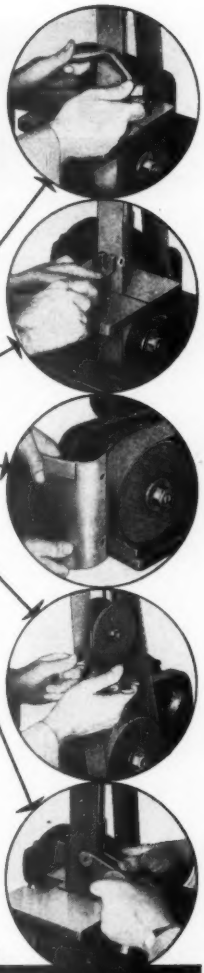
**PLATEN**
**CONTACT**
**CONTOUR**
**INSIDE**



WRITE FOR ABRASIVE BELT
GRINDER-POLISHER CATALOG NO. 325

*Hammond Machinery Builders* INC.

1631 DOUGLAS AVENUE • KALAMAZOO, MICHIGAN

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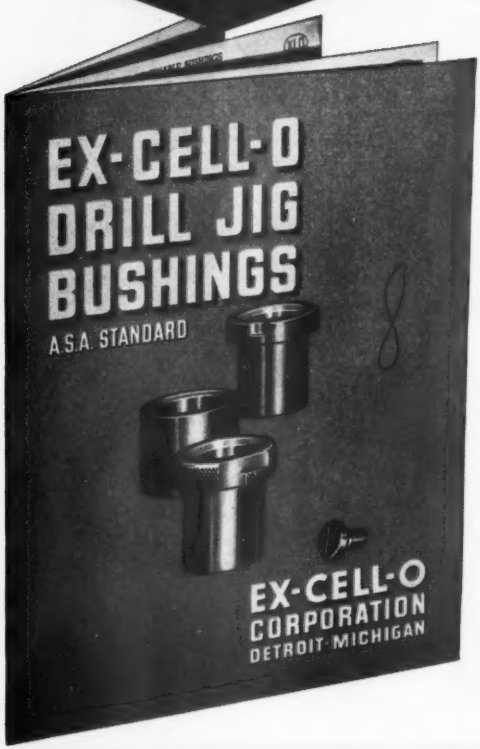
# GET THE FACTS ON




*Ex-Cell-O is a pioneer in the manufacture of drill jig bushings to close hole limits. Naturally, these closer limits make possible longer tool life and greater accuracy.* Ex-Cell-O, noted as headquarters for precision-made bushings, carries one of the largest and most varied stocks of drill jig bushings available in the world. A.S.A. Standard bushings can be obtained directly from Ex-Cell-O's Detroit and New York offices and from the Machinery Sales Company in Los Angeles. Send for Ex-Cell-O Catalog No. 11882, giving standard bushing sizes.

XLO
EX-CELL-O for PRECISION

48—40

## EX-CELL-O CORPORATION
DETROIT 32 · MICHIGAN

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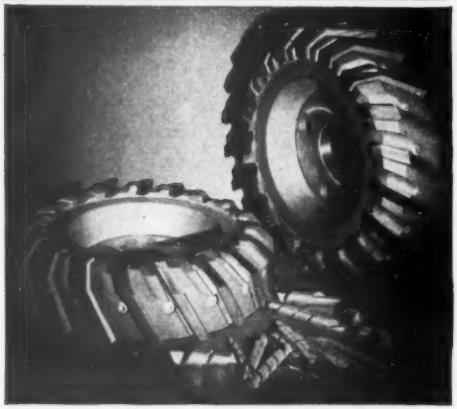
# INGERSOLL SHEAR CLEAR
## *The Ultimate in Face Milling*

**FOR MILLING:**
Cast Iron
Steel
Aluminum
Non-ferrous alloys

**WITH BLADES OF:**
High Speed Steel
Super High Speed Steel
Cast Alloy —
Rexalloy and Stellite
Carbide Tipped
Cast Alloy Tipped

**PRODUCES:**
Increased Production
Superior Finish
Longer Tool Life
Low replacement blade cost
Small initial investment



**WE CAN PROVE THAT:** The Ingersoll patented *Shear Clear* face mill will outperform all other cutters. It is not "just another milling cutter", but a special tool. There is not just one *Shear Clear* but several different types. Each is developed for a specific application, using variations in cutting angles, blade materials and grades of carbide.

The combination of cutting with a bevel using apparent steep positive axial rake and negative radial rake angles produces a new revolutionary cutting action. *Shear Clears* cost no more than ordinary conventional types of face milling cutters. You should take advantage of them.

May we have an engineer call and recommend the proper *Shear Clear* for your shop so you too can profit from the ultimate in faster milling?

Shear Clears with carbide tipped blades milling cast iron cylinder block at 48" per minute feed, 175 ft. min., removing 1/8-3/16" stock.

Note how Shear Clear chip is forced to coil out along the blade away from finished surface and is thrown clear of cutter at end of cut. This action produces smoother finish, faster feeds, longer tool life, and less power requirements.

Milling SAE 2330 test block with 10" diameter Carbide tipped Shear Clear. ¾" stock, 8" wide cut, 300ft. min., 16"/feed, 105 horsepower.

**SEND FOR CUTTER CATALOG—** *Use this handy coupon*

**Complete information on Ingersoll Shear Clear and all other types of inserted blade milling and boring tools . . . illustrations, detail drawings, specification tables, grinding charts, how to order.**

**THE INGERSOLL MILLING MACHINE CO**
**ROCKFORD, ILLINOIS**
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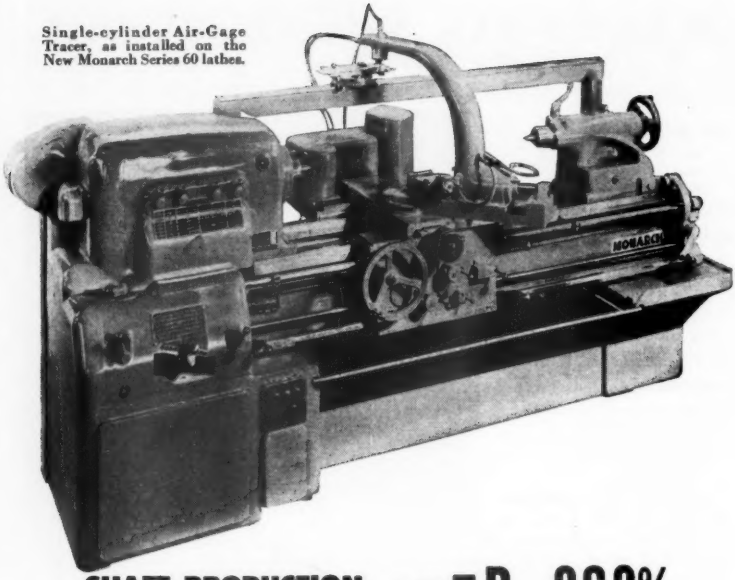


Single-cylinder Air-Gage Tracer, as installed on the New Monarch Series 60 lathes.

# SHAFT PRODUCTION UPPED 362%

## With the New Monarch Air-Gage Tracer

*Production time was cut from 174 hours down to 48 hours—for a large and representative lot of shafts.*

This manufacturer's savings in time through the use of the Air-Gage Tracer is typical—as are the other savings made in this installation. Here's the story:

Shafts ranging in diameter from 3″ to 4½″ had been turned on modern manually-operated lathes, leaving .015″ to .020″ of stock for the grinding operation. Air-Gage Tracing holds diameter so closely (.002″ on the average) that the stock left for grinding was cut in half. Grinder costs decreased, too.

Here's the payoff. Two Air-Gage Tracer equipped machines replaced five manual machines for this manufacturer—and they're out-performing the original battery, with more production—of far higher quality.

Let us show you how these modern Monarch Air-Gage Tracer equipped machines can cut your costs on shaft work and turned or bored contours and tapers.

**THE MONARCH MACHINE TOOL COMPANY • Sidney, Ohio**

Monarch TURNING MACHINES

**FOR A GOOD TURN *FASTER* – TURN TO MONARCH**



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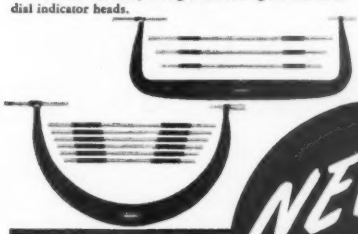
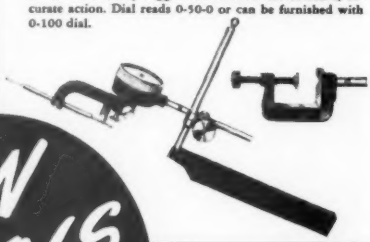
## TUBULAR MICROMETERS
### "C" and "U" Types

Hollow frames combine lightest possible weight with extreme rigidity for greater accuracy, sensitive positioning and less fatigue in measuring dimensions up to 168" and more. Made with fixed, sliding or interchangeable anvils or dial indicator heads.



## DIAL TEST INDICATOR
### No. 645 — Heavy Duty

For severe applications around machinery or for continuous use in general tool work. Special spiral-type mechanism of unusually rugged construction for sensitive, accurate action. Dial reads 0-50-0 or can be furnished with 0-100 dial.



# NEW TOOLS by Starrett

## TOOL MAKER'S HAMMER
### With Built-In Lens

A handy little hammer for spotting in layout work, light hammering, heading, etc. Built-in magnifier saves hunting and fumbling for glass. Offset head permits working in close quarters.

## POCKET DIAL INDICATOR
### No. 1010

An ideal precision-made gage for measuring paper, leather, sheet metal, wire, plastics, etc. Indispensable for inspectors, salesmen, buyers, stock clerks. Dial reads in thousandths, 0-.100", range ¾" with "rev" counter. Chrome plated case, all parts stainless steel, non-breakable crystal. Decimal equivalents on back.

## "SATIN CHROME" MICROMETERS

An important new feature now on *all* Starrett Micrometers. Non-reflecting *Satin Chrome Finish* eliminates glare, retards corrosion, increases speed and accuracy. Also: Hi-Micro (mirror-like) finish on anvil and spindle faces; threads hardened, stabilized and ground from the solid; decimal equivalents marked on the frame; simple adjustment for wear.

Those And Many More Fully Described In STARRETT NEW TOOLS BOOKLET Send For Your Copy

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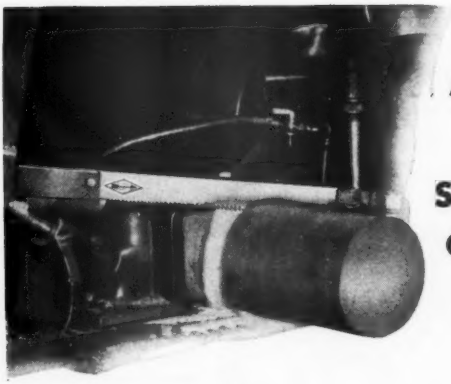

# Can You Answer "Yes" TO THESE SIX IMPORTANT QUESTIONS?

1. Am I obtaining maximum number of square inches cut per blade?
2. Am I using correct feed and speed to balance production against tool cost?
3. Do I use correct length and pitch of blade for size and type of material being cut?
4. Am I nesting materials in the most efficient manner?
5. Am I cutting my material in the shortest possible time consistent with normal blade life?
6. AM I USING THE RIGHT BLADE?

If you can answer "yes" to all six, then you can be sure that your production hack saws are operating most efficiently. If you cannot, then Barnes is ready to match its top quality hack saw blades plus its knowledge of metal sawing against your cutting problems.

Barnes Service Engineers can give you the correct answers to all of these questions. With their help and with Barnes Blades on the job, you will be assured that your production power hack saws will deliver maximum cutting efficiency. Your Barnes Distributor will have a Barnes Service Engineer call on you whenever you say — no obligation.

*The Barnes Hack Saw Production Calculator, with valuable information on metal cutting, will also help you get the most from your power hack saw. It's free on request; just write on your letterhead today. We'll be glad to send it to you.*

BARNES

Established 1919

**W. O. BARNES CO., INC.**

1297 TERMINAL AVE. DETROIT 14, MICH.



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Announcing

A BASIC DESIGN IMPROVEMENT

## ...the New Gorton *RATIOBAR 3-Dimensional Pantograph for Light Milling and Engraving

**This revolutionary machine features the new and exclusive *RATIOBAR Tracer Control—the first basic design improvement in pantograph construction since the first pantograph was built.**

Manufacturers of small intricate dies, molds, hobs, stamps and other related products placed firm orders sufficient to take all of the first production run after inspecting the pilot model — real proof of the value built into the P13.

### What is *RATIOBAR tracer Control?

*RATIOBAR Tracer Control is the name for the newly developed principal of control, found only on the Gorton P13. It does three important things: permanently aligns the pivot center, cutter spindle and tracing style in an absolute straight line without guessing or innumerable adjustments; enables the operator to set reduction ratios with just one slider block; it provides rigid support for all pantograph linkages. No other manufacturer offers these advantages in a pantograph.

Easier operation and better balance are also assured with the *RATIOBAR because linkages move toward the pivot center as the tracer moves out and away from it. For detailed information, use coupon below.

### OTHER MODELS FOR OTHER WORK

The new Gorton P13 is just one of a family of cost-cutting, precision pantographs. Your requirements may call for the 3-L — largest 3-Dimensional Pantograph available today, the 3-U or 3-Z for light or medium milling and engraving in 2 dimensions, or you may require special adaptations or tooling. Our Engineering Service is ready to serve you without obligation.

GEORGE GORTON MACHINE CO.

FREE . . . COMPLETE INFORMATION. Data on the new Gorton P13 as well as other Gorton pantographs. Write for Bulletin 1580 today.

PLEASE SEND WITHOUT OBLIGATION
Bulletin No. 1580 - 1211

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All Standard Accessories
Dowel Pins, die springs, stripper bolts, socket head cap screws and other accessories distributed by DETROIT DIE SET CORPORATION are nationally known products. All are manufactured with the same precision as "DETROIT" die sets. Representatives in or near your community can supply all standard items in a wide range of sizes. Phone, wire or write "DETROIT" for prompt delivery.
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DIE SETS ★



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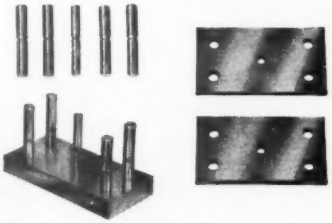
# 3 Hole Grinding Problems — CAN YOU ESTIMATE THE TIME?

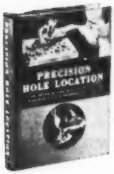
**TWO-STATION DIE BLOCK**

All holes ground to exact size and location. Blank hole and center piercing hole ground with one half degree included taper. Little clearance permissible between punch and die. 2¾ *hrs. on the Moore Jig Grinder.*



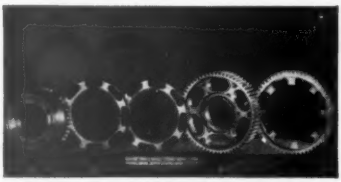
**TEN HOLES IN MASTER PLATES**

Hardening distortion corrected in two plates. Ground to size and location *independently* and to plug gage fit in any of the four possible positions. 3½ *hrs. on the Moore Jig Grinder.*



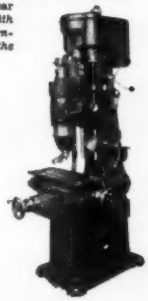

**HAVE YOU BOUGHT YOUR COPY OF "PRECISION HOLE LOCATION"?**

An entire chapter of this authoritative handbook on toolmaking practices is devoted to an engineered solution of the problem of correcting holes by Jig grinding. Over 5,000 copies have been sold to date. Available at special price of $3 in U.S.A.; $3.50 outside U.S.A. 448 pages, over 400 illustrations. 184 pages of Woodworth Coordinate Location Tables from 3 to 100 holes. Send check or money order to Moore Special Tool Co., Inc., Bridgeport 7, Conn.



**FIVE ACCESSORY GEARS IN MASS-PRODUCTION**

*Gear A:* Eight holes on circle ground to size and location within ±.0003"...*Gears B, C, D, E:* Radii at ends of elongated pockets ground to size and location within ±.0003"...*Gears B, C:* Radii ground to shoulder near bottom of pocket within ±.0005". *With special indexing fixture, 4 aircraft engine gears per hour finished on the Moore Jig Grinder*



"Correcting Hole Location Within Less Than .0001" is the title of our new 28-page catalog which describes the operation and applications of the Moore Jig Grinder to dies, drill jigs, gage parts, master plates and production parts. Write for your copy today.
MOORE SPECIAL TOOL CO., INC. • 741 UNION AVENUE, BRIDGEPORT 7, CONN.

**ADD MOORE TOOLS TO YOUR TOOLROOM**

JIG BORERS JIG GRINDERS HOLE LOCATION ACCESSORIES
DIE FLIPPERS PANTO-CRUSH WHEEL DRESSERS



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# Only a few minutes' *Set-Up Time*

and you're ready to make a

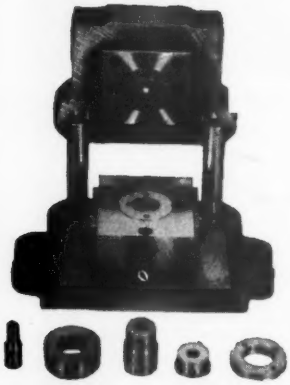
***NEW SIZE WASHER***

when you use...

## HOVIS

UNIVERSAL MASTER

WASHER DIES



Once having made a nominal investment in Hovis Master Washer Dies to fit your requirements, all you need is to change five small easily removable parts to make a new size washer. This takes only a few minutes. Think of what this means in the saving of time, materials, process engineering, tool designing and tool tryout! And you can make washers on short notice as you need them, avoiding large inventories. The Master Dies themselves do not become obsolete.

Write for illustrated folder.

← Made in 5 sizes:

¾"—1½"—2½"—4"—6".

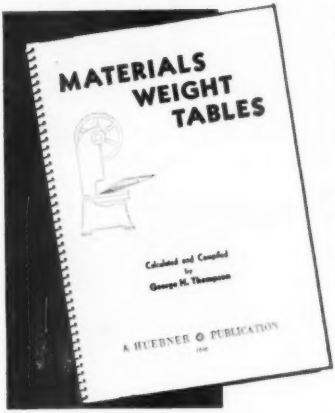
**HOVIS SCREWLOCK COMPANY**

8100 E. NINE MILE ROAD
Phone: Centerline 1575

VAN DYKE, MICHIGAN
Suburb of Detroit

# Every STAMPING PLANT needs . . . .

George H. Thompson's




"Faster than a Slide Rule" for calculating the total weight of sheet stock required for a given press run.

"Easy to use" — only one computation instead of the four usually necessary with a slide rule.

The book includes 32 pages of tables for sheet stock, 4 pages for bar stock, 3 pages for drill rod and conversion factors for 20 different metals, thus making the tables apply to almost any stock you might be working.

*$2.00 per copy.*
*Order from*

**TOOL & DIE JOURNAL**
**1975 Lee Road**
**Cleveland 18, Ohio**

• • •

*Put the "POCKET-SIZE MACHINE SHOP" to Work!*

**MOTO-TOOL No. 2 WITH EMERY POINT**
**$16.50**

**Approx. 27,000 R.P.M.**

DREMEL'S Improved MOTO-TOOL . . . the little electric grinder that does big jobs . . . can save you hours, by speeding up work now being done by hand. Invaluable for sharpening taps, drills, gauges, chisels, tools and cutters (without tearing down "set-ups"). Dremel Moto-Tool is a "war veteran" . . . used by all branches of the Armed Forces in far-flung repair bases . . . helped to set production records at General Electric, Westinghouse, Remington Arms, Ford, Nash-Kelvinator, Northrup, Douglas and other plants.

**Look for These MOTO-TOOL Features**

• Housing has "pencil-type" finger grip • Instant-action, wrenchless chuck • Oil-less, sealed, trouble-proof bearings • Patented automatic chuck lock pin • Oversize armature shaft, hardened, ground and polished • 110 volt, universal type (AC-DC) motor • Easily replaced commutator brushes • About 27,000 R.P.M.: cuts cleaner . . . saves cutters • Sliding snap-type switch • Handy hanger hook • Cord protector • Sturdy, shock-proof Bakelite housing • Dust-filtered air-cooling system • Weighs only 13 oz. . . . shaped to fit the hand • Dynamically balanced for vibrationless operation.

**MOTO-TOOL KIT No. 2**

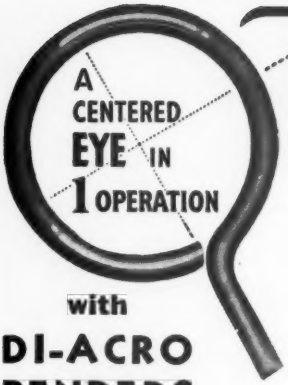
**WITH 23 ACCESSORIES**
**$23.50**

PRE-WAR PRICES STILL PREVAIL

MOTO-TOOL KIT NO. 2, with 23 accessories (high speed steel cutters, grinding wheels, polishing accessories) and heavy-duty professional Model 2 Moto-Tool in natural finish, hardwood case.....$22.50. (Items purchased separately would cost about $30.00; you save $6.50.)
Moto-Tool No. 2, with one emery point $16.50

**See your mill supply dealer. If he does not handle Moto-Tool, write the factory.**

**DREMEL MANUFACTURING CO.**
Dept. T-528-J Racine, Wis.




# Precision CENTERED EYE Bending

with

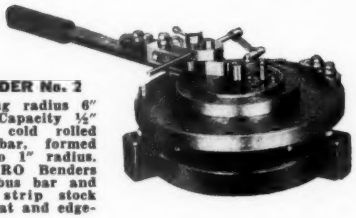
## DI-ACRO BENDERS

The DI-ACRO Bender makes perfectly centered eyes from rod or strip stock at a high rate of production. Both eye and centering bend are formed with one operation. Any size eye may be formed within capacity of bender and ductile limits of material.

DI-ACRO precision bending is accurate to .001" for duplicated parts. DI-ACRO Benders bend angle, channel, rod, tubing, wire, molding, strip stock, etc. Machines are easily adjustable for simple, compound and reverse bends of varying radii.

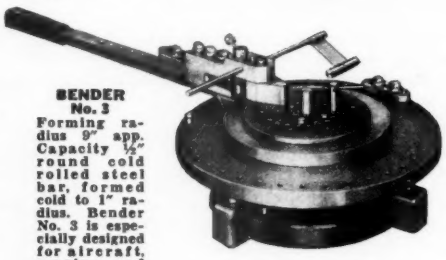
**BENDER No. 1**

Forming radius 2" app. Capacity 7/32" round cold rolled steel bar or equivalent. All DI-ACRO Benders have two-way action, right or left-hand mounting and reversible forming nose.



**BENDER No. 2**

Forming radius 6" app. Capacity ½" round cold rolled steel bar, formed cold to 1" radius. DI-ACRO Benders form bus bar and other strip stock both flat and edgewise.



**BENDER No. 3**

Forming radius 9" app. Capacity ½" round cold rolled steel bar, formed cold to 1" radius. Bender No. 3 is especially designed for aircraft, marine and other large radius bending.

**Send for Catalog "DIE-LESS DUPLICATING"**

showing many kinds of "DIE-LESS DUPLICATING" produced with DI-ACRO Benders, Brakes and Shears.

**DI-ACRO IS PRONOUNCED "DIE-ACK-RO"**

DI-ACRO PRECISION MACHINES DIE-LESS DUPLICATING

**O'NEIL-IRWIN MFG. CO.**

315 8th Avenue • Lake City, Minnesota



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# LOST ANY DIAMONDS LATELY?

**—then it's a cinch you'd better change to the dresser with the**

## "EDUCATED DIAMONDS"

**(They stand abuse . . . and *can't* come loose!)**

Imbedded in a matrix of super-hard Carboloy Cemented Carbide, these keen-cutting diamond points stand *real abuse* . . . they can't come loose! They hold on "for dear life" throughout their entire period of usefulness.

You not only save on diamond replacement and remounting, but you can operate at faster traverse speeds.

Savings in diamonds, savings in time! Worth investigating? Sure it is. Send in the coupon asking for free booklet. There's no obligation . . . and you stand a chance to save up to 40% on dressing costs!

FREE BOOKLET

**DIAMOND DRESSERS**

**by CARBOLOY ®**

**CARBOLOY COMPANY, INC., 11111 E. 8 Mile Road**
**Detroit 32, Michigan**

**Gentlemen:**

**Please send me free booklet No. DR-480, describing how these Carboloy dressers can save up to 40% on my dressing costs.**

*Name*_____

*Title*_____ *Company*_____

*Street*_____

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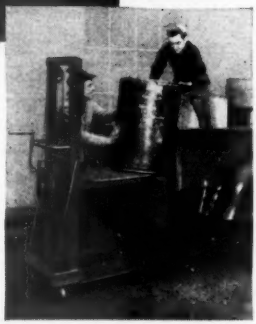
# SHOPLIFTER

***Sturdy, compact, for really heavy lifting jobs. Saves time, saves men, saves materials. Three models, 500 lbs. to 2000 lbs.***

**Heavy Duty Type DX— 2,000 lbs.**

**Type D— 500 lbs.**



All steel, welded, framework. Easily operated hoist unit with automatic brake, holds load at any height.

**500 pound capacity**

Type D, hand operated.....$157.50
Type DE, electric 1/3 HP unit.....$315.00

**1000 pound capacity**

Type DX, hand operated.....$320.00

**2000 pound capacity**

Type DX, hand operated.....$370.00

*Floor lock to hold machine steady:*
*$10.00 extra for 500 pound sizes;*
*$15.00 extra for type DX models.*

## ECONOMY ENGINEERING COMPANY

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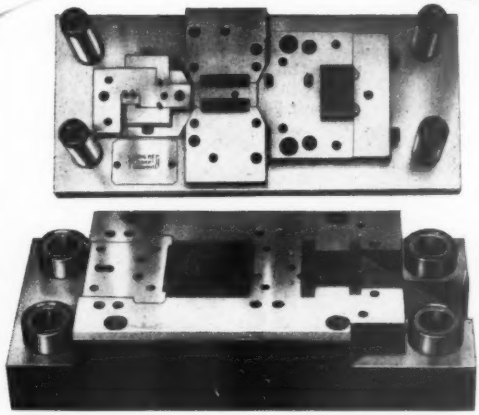
YOUR PRODUCT DESERVES

# The Finest HARIG LAMINATION DIES

## THE ULTIMATE IN PRECISION WORKMANSHIP



## CARBIDE

**NOW PRACTICAL FOR LAMINATION DIES.**

**Illustration Shows Typical HARIG Carbide Die.**

Section of Our 17,000 Sq. Ft. of Die Making Space. Illustration Shows a Portion of Surface Grinding Dept.

Also STAMPING DIES OF ALL TYPES
JIGS, FIXTURES, GAUGES, SPECIAL MACHINE WORK

*Your Inquiries Invited*

# HARIG

## MANUFACTURING CORPORATION

321 NORTH ALBANY AVE., CHICAGO 12, ILL.

# *Norton Announces . . .*

## A Revolutionary Process for Making Grinding Wheels Better . . . and Faster

PRECISE CONTROL is the keynote of the new Norton process for making vitrified grinding wheels—precision mixing, precision molding, precision electric burning. And precision in manufacture means a precision product.

### Precise Size

Grinding wheels made by this new Norton process are dimensionally accurate within thousandths of an inch—machine readjustments when new wheels are mounted are practically never necessary.

### Precise Grinding Action

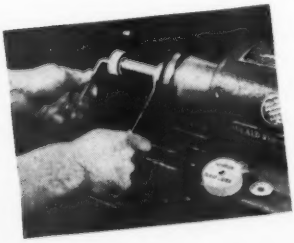
The control methods of the new process have brought a new uniformity to grinding action not only throughout the life of each individual wheel, but from wheel to wheel and from lot to lot.

### Precise Balance

Because of precision molding and precision burning, precise balance is inherent in the wheels—it's there to start with and it stays as the wheels wear down.

### Faster Service

Not only does the new process make wheels better but also faster. Burning time alone has been cut from a matter of days to mere hours. Many customers who have been using wheels made in the pilot plant are already aware of the improved service that has been made possible by the revolutionary process.



**Slip off the old wheel, slip on the new and start grinding—no machine readjustments are necessary, no changing of feeds or speeds because grinding action is different. Wheels made by the new Norton process are really uniform—both in dimensions and in grinding action.**

NORTON ABRASIVES

Abrasives • Grinding Wheels • Grinding and Lapping Machines • Refractories • Porous Mediums • Non-slip Floors • Nitride Products • Labeling Machines

# A Vast, New Plant to House the New Process

FIVE ACRES of floor space—the largest building in the world for making grinding wheels—that's the new Plant 7 of Norton Company. It was especially designed to house the new grinding wheel manufacturing process envisioned by board chairman, George N. Jeppson, and perfected by Norton development engineers.

## $4,300,000 Investment

When this new process had been proved both in theory and by the very successful operation of a pilot plant, Norton was ready to invest millions of dollars in Mr. Jeppson's revolutionary idea. Ground was broken in April 1947 for this mammoth building—602 feet long and 320 feet wide.

## Straight Line Production

The new process lends itself ideally to straight line production and maximum use has been made of this in the new building. Abrasive grain and bond are brought into one end of the building and the various production steps take place one after another—including a radically new and continuous electric firing process.

## Ten Million Wheels Already Made

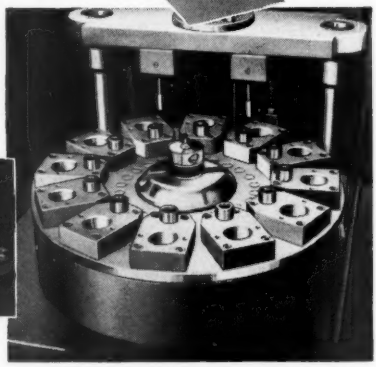
The complete success of the new process has been definitely proved by the ten million grinding wheels already made by it—first in the pilot plant and in recent months in the new building. Many customers, especially in the field of internal grinding, have been using the wheels and are enthusiastic about them. In both dimensional accuracy and uniformity of grinding action they are far beyond anything previously available in a grinding wheel.

Airplane View of New Norton Plant 7

# 10-WAY

## INSTANT DIE CHANGES

**slash production costs on short runs**



## MULTIPRESS*

**features unique dial-feed tooling ... handles small high-speed production runs in rapid sequence**

A new high in small-parts production efficiency! The dial-feed table of this MULTIPRESS is fitted with 12 tool-holding "nests," which fit 10 different sets of interchangeable dies. Down time is cut to near-zero; tool changes require little more than lifting one set of dies from the nests, and setting new ones in place. Guide pins automatically locate the table dial. Through this quick change-over, one MULTIPRESS handles work that ties up two or three ordinary presses.

This user makes additional gains by equipping *three* MULTIPRESS units with identical tool-holding fixtures. Each press can use any one of the ten sets of dies.

Wherever you need fast, *careful* pressure application, MULTIPRESS is your answer. And the MULTIPRESS Dial-Feed Accessory makes the job *automatic*. Built in 4, 6, 8, and 25-ton capacities, MULTIPRESS offers accessories for almost every type of work. Write for details.

**The DENISON Engineering Co.**
1197 Dublin Rd., Columbus 16, Ohio

DENISON EQUIPMENT for APPLIED HydrOILics



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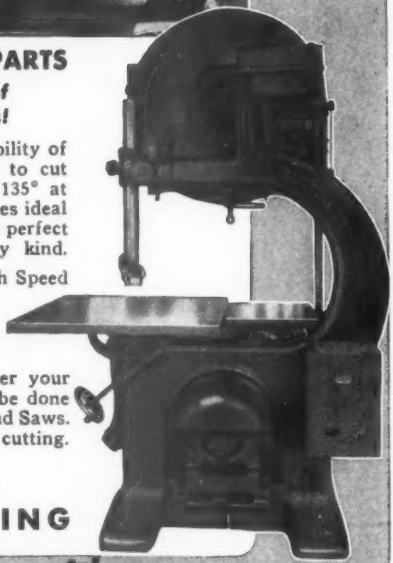
# The SUPER METHOD

**of TRIMMING FORMED PARTS**

***and performing a host of other metal cutting jobs!***

The negligible down-drag and the ability of Tannewitz High Speed Band Saws to cut sheet metal from 90° to near 0 or 135° at tremendous speed make these machines ideal for trimming. Cuts can be made with perfect safety without using a rest of any kind.

Friction sawing with Tannewitz High Speed Band Saws also results in perfectly amazing time savings in the cutting of flat sheets, soft or hardened steels, armor plate, plastics, glass and many other materials. Whatever your cutting problem, chances are it can be done better and faster with Tannewitz Band Saws. Investigate this "Super" method of cutting.



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**FRICTION SAWING**

*with* **Tannewitz**

**HIGH SPEED BAND SAWS**

**THE TANNEWITZ WORKS** GRAND RAPIDS 4, MICHIGAN




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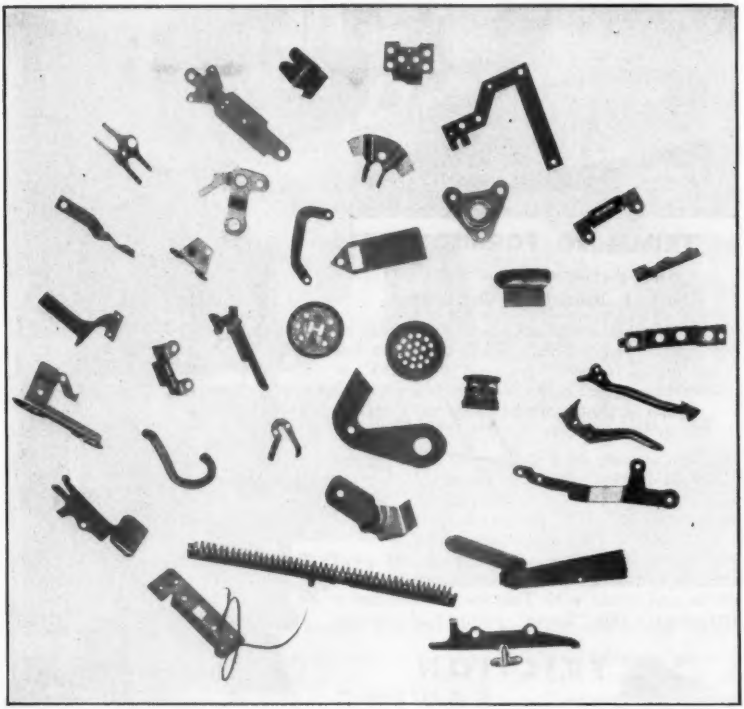
# A MEDIUM SIZE TOOL AND DIE PLANT THAT HAS THE TECHNICAL ABILITY AND FACILITIES TO DESIGN AND BUILD PRECISION PRODUCTS



*Dies for these parts designed and built by BUNELL*

Bunell has plant capacity to handle your requirements—40,000 square feet of factory floor space—175 machines—adequate manpower in engineers, machinists and die makers.

*Send Us Your Blue Prints for Quotations*

THE BUNELL MACHINE AND TOOL COMPANY

1601 East 23rd Street • CLEVELAND 14, OHIO



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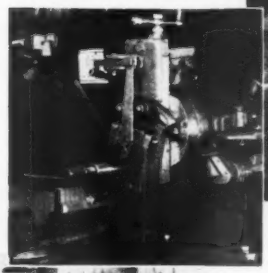
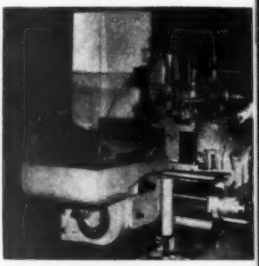
Power down feed speeds vertical facing and slotting.



The Cincinnati automatic tool lifter is essential for carbide tools and high speeds.



Supplementary table top for extra large clamping space

Auxiliary front cross feed is very helpful for developing contours.

# FAST SHAPING

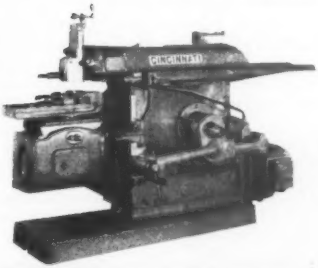
## ...and wide utility, too!

Powerful Cincinnati Shapers are tailored to your needs—the many features available to you will both speed your job and widen the use of a shaper in your shop.

Cincinnati Shapers are accurate, speedy and versatile. They are the handy man of industry.

Write for Catalog N-3, describing the many features and many types of Cincinnati Shapers available to you.

Power elevation to the rail, with all controls convenient to the operator, reduces setup time.




A Cincinnati Shaper with universal table is especially useful for tool room and die work.

**THE CINCINNATI SHAPER CO.**

CINCINNATI 25, OHIO U.S.A.

SHAPERS · SHEARS · BRAKES



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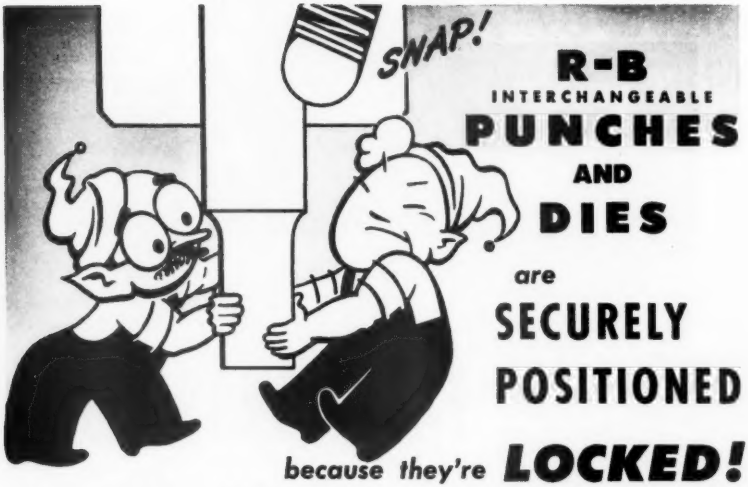


# R-B INTERCHANGEABLE PUNCHES AND DIES are SECURELY POSITIONED

## because they're LOCKED!

Once inserted . . . a simple matter of a push and a twist . . . R-B punches and dies stay in place, accurately positioned both vertically and radially for perfect alignment with the mate. Spring-held ball bearing locks in R-B retainers prevent *all* movement of punches and dies until released.

Because R-B products are made from selected steels with closely controlled hardness, finish and tolerance, they are all uniform and interchangeable. R-B interchangeability also lowers punch and die inventories and enables press operators to make quick changes so that press "down time" is kept at a minimum. These R-B advantages, fully proved by years of varied production use, are a few of the reasons why R-B punches and dies are now "standard" in the metal-working and plastics industries.

**GET THE WHOLE STORY**
**In This FREE Catalog**

*A 48 page book containing full information on Allied's "one stop service." Write for your copy.*

**. . . and CHECK THESE R-B ADVANTAGES**

- ✓ Simple in design and construction.
- ✓ Saves time and money in die building.
- ✓ Unlike most parts used in die construction, R-B products have a salvage value.
- ✓ Punches and dies of standard sizes, shapes and materials carried in stock for immediate delivery.
- ✓ Special punches and dies made promptly to your specifications.

**ALLIED PRODUCTS CORPORATION**

Department 25 • 4634 Lawton Ave. • Detroit 8, Michigan



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*You're OK with* **P-K** *for...*

**A new standard** of quality and uniformity has been pioneered by P-K in the quantity production of Cold-forged ***Ground Thread*** Socket Set Screws. Ground on hardened blanks, threads are mirror-smooth, assure uniform, dependable Class 3 Fit. Free from nicks, burrs and hardening scale, they have none of the imperfections common to cut threads.

**Compare! Ask for Samples.** See why P-K Ground Thread Socket Set Screws are different from ordinary set screws as night and day. You'll agree your products will benefit — assembly-wise and sales-wise! Parker-Kalon Corp., 200 Varick St., New York 14, N. Y.

**AVAILABLE FOR PROMPT DELIVERY**

GOOD JUDGMENT CALLS FOR
**PARKER-KALON**
WHEN GOOD DESIGN CALLS FOR
**SOCKET SCREWS**
SOLD ONLY BY ACCREDITED DISTRIBUTORS




SEE ADVERTISERS INDEX, PAGE 71, FOR KEY NUMBERS

# appetites vs production

A. G. Bryant, president of the National Machine Tool Builders' Association, has just returned from an extended trip in Europe, which was taken at the request of the Economic Cooperation Administration. We were privileged, within the past few hours, to get first-hand from Mr. Bryant some very interesting observations resulting from his trip. Our readers should be interested in these because of Mr. Bryant's position in our industry as president of the Bryant Machinery and Engineering Company, and vice-president of the Cleereman Machine Tool Company.

Mr. Bryant grants that no one, acquainted with the current situation in Europe, questions the urgency for providing food, coal and raw materials to the devastated and thread-bare countries. The needs have been critical and our help has been essential. BUT, as Mr. Bryant said:

"Relief shipments serve as palliatives which sooth the patient, whereas less comforting but more corrective measures should be instituted. The great need of Europe is for the production of goods; and adequate production can be obtained only by the use of facilities such as machine tools. Continued delays, therefore, in the shipment of production machinery, occasioned by the pressure of recipient nations that ECA dollars be used largely for goods that satisfy appetites, are slowing the progress towards real recovery."

Mr. Bryant in no wise criticizes the job being done by ECA administrator Paul G. Hoffman.

"The ECA has, in these few months of operation under the leadership of Mr. Hoffman, accomplished a great feat in forming an organization that has so quickly furnished life-giving materials and supplies to the distraught areas. The problem is for this same organization to more quickly change the emphasis from relief to recovery. This change can be accomplished by ECA only with a drastically changed attitude on the part of the governments of the participating nations."

Mr. Bryant reminds us that the ECA must operate in accordance with the Congressional acts which created it, and that any policy which does not permit using our influence to direct the proper use of ECA funds is one which the American public and Congress, under far-seeing leadership, must revise so that ECA can do a more immediate and effective job of pressing for recovery instead of relief.

"Our recovery organization, mindful of the dictates of Congress and of traditional American insistence that we avoid dictating policies to foreign governments, has leaned over back-

wards in its hesitancy to suggest to the recipient nations under ECA the kind of medicine they ought to request in exchange for their ECA dollars. The sixteen countries under ECA have been given freedom to initiate the programs for relief and for recovery. In too many instances, politicians of the local countries have centered their demands in continuing requests for food and supplies of a type that would satisfy the appetites of their constituents and thereby gain their continued popular favor. In too few cases have they insisted that some of the demands for supplies be curtailed in order that production facilities might be included within the allotments of available funds."

One of Mr. Bryant's most arresting remarks was that "America gets no credit for its bashfulness in failing to insist upon a sounder appropriation of funds. Government officials of the various countries, as well as private business men, expressed in fact to me great surprise that America has not demonstrated more direct control in requiring local governments to balance their requests more effectively. British leaders have been free themselves to point out that in the generations prior to the first World War, when Great Britain was the leading creditor nation, it specified not only the terms of its loans but also in its trade agreements the sources and the kinds of commodities that should be included."

Mr. Bryant's concluding remarks show us that we, all of us, the providers of Uncle Sam's dollars, should, in every way possible, impress upon our lawmakers that steps should be taken, because,

"Millions of dollars in orders for American machinery of various classes have been entered in Europe during the past year, and little of this has been released. If dollar credits had been available, some of the equipment required could have been in actual production for many months turning out the goods for which Europe is crying. Instead, however, local governments have not included some of these requirements in their schedules for allotments under ECA, and now only under the insistent prodding of their own industrialists have they belatedly started to request necessary appropriations.

"The time is late. Much has been lost in the recovery schedule by a failure at an earlier date to provide such facilities. In the interest of conserving American goods, of utilizing our aid dollars more effectively and of helping to accomplish more quickly the economic stability for which the ECA is intended, American public opinion should urge that our authorities more pointedly direct the needy countries in a wider demand for production facilities in their ECA allotments."

E. Willard Cunningham

*editor*

# Metallurgical Control of Deep Drawn Stampings from Cold Rolled Steel*— *Part I*

The present day car customer little realizes the engineering development necessary for the production of new model cars. The tool and design engineers well appreciate the tremendous detail which must be engineered before the first model comes off the assembly lines.

Let us briefly follow the necessary steps in the design and construction of new dies for a new automobile body.

**by N. E. Rothenthaler**
*Superintendent of Production*
*Steel Operations*
*Ford Motor Company*
*Dearborn, Michigan*

After the styling department has submitted several body designs, an approved design is selected by the management. These designs are made originally as drawings, and, as the selections are narrowed down to a few designs, quarter size clay models are made. When the basic design has been approved, a full size clay model is made which is finished in detail representing the final model.

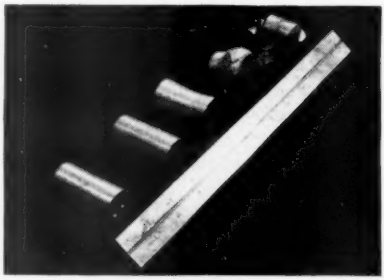
The production design department at this time proceeds with the cross-section development from the model submitted by the styling department. The design engineering is developed in cooperation with the Tool Design Department and the Shop Superintendent's Office. As these cross-sections develop and are agreed upon, a crew of layout draftsmen create coordinated surface lines into a symmetrical figure, smoothing out slight irregularities and developing all openings. After the basic exterior design has been agreed upon, the general supporting structure is designed, using the reference cross-sections mentioned previously. General construction detail drawings are then started.

At the same time as these drawings are started, the Template Department and the Pattern Shop are brought into consultation and the master templates are reproduced. These templates are submitted to the Pattern Shop for the production of hammer forms and master die models.

Preliminary detail prints are submitted to the Tool Design Department for the coordination of all tooling, dies, jigs and fixtures, floor layouts, presses, welding equipment, and a general plan of manufacture. The Estimating Department also receives a set of preliminary prints to begin their cost analysis.

Upon the completion of master templates, hammer forms are constructed from hardwood, such as birch or maple, and are reinforced at the edges and corners with steel strips. From these hammer forms a set of hand-made parts is formed.

*Fig. 1. Test Specimens of Cerrobend:*
1. *Before load test.*
2. *After load of 5,650 lbs.—Cooled in liquid $N_2$ to −320° F.*
3. *After load of 9,000 lbs.—Only partially cooled in liquid $N_2$.*
4. *After load of 5,650 lbs.—Uncooled.*
5. *After load of 18,500 lbs.—When fully cooled.*



*From the ASTE 1948 Annual Convention Technical Sessions.

Upon the completion of the hammer forms, the model shop begins the construction of the master die models which are completed to a rough state of finish. Before completing these master die models, a general supervisory study is made of the first set of hand-formed parts, for a general agreement as to points of fastening of the exterior parts. These master die models are built in such a manner that they can be dovetailed together in one large assembly and the overall construction studied for difficulties before delivering the individual master panel die models to the Tool Room.

By this time the hand-made sample parts are completed and the Metal Shop Layout Department receives the detailed prints from the Engineering drafting department so that they can set up the sample part and check it for finished contour.

During the process of making the sample body, the Project Engineer keeps a close watch for possible chances to improve the general design of construction, and imparts this information to the draftsmen, who correct the detail drawings and release them as checked prints to the Tool Room and the Master Die Model Division. These checked prints are the beginning of tool construction, as only Tool Design works with preliminary prints. Likewise, the checked prints give the Purchasing Department a chance for multiple bids.

This summarizes the necessary steps for the development of a new model design from the artist's original drawing to the basic master die models. These die models and detailed drawings are now submitted to the Tool Room and Pattern Shops for the construction of the production dies. Patterns are made for the cast iron dies, and plaster models are made for machining the rough cast dies on the Kellers. As the front fender dies require the greatest amount of detailed development, let us follow these details step by step.

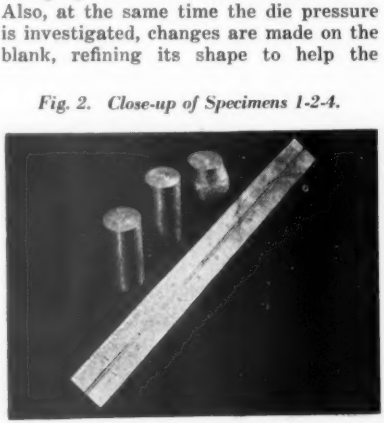
A quarter-size model is first developed. These dies are made exact in every detail, but scaled down to quarter-size. A completed set of dies is made and finish machined and sent to the Pressed Steel Department for the fender development. As these dies cost only a tenth as much as a set of full-sized dies, it is economical to develop the fender on this small die rather than to attempt to use a set of large dies which may have to be scrapped.

The angle of the punch is based upon the past experience of the die men in the Tool Room, which in their judgment will result in the most efficient fender production both for performance and for blank size.

As these dies, when received from the Tool Room, are rough and un-matched, the first step is the tedious job of hand grinding and lapping the male and female dies to exact match. The dies are spotted for uniformity throughout with proper clearance for the gage of the stock. Exactly one-fourth the final gage sheet is used on these dies. This stock is between ten and eleven thousandths of an inch in thickness.

After the dies have been properly spotted to exact uniformity in clearance, the pad pressure is regulated. This is accomplished by the trial and error method of inserting rough shaped blanks and slowly inching the punch down in various stages of pre-form. Each preformed blank is closely examined for buckle indications or yield points which indicate poorly regulated pad pressure. These adjustments are made either by additional grinding on the pads or by changing bead locations or die radii. Also, at the same time the die pressure is investigated, changes are made on the blank, refining its shape to help the

*Fig. 2. Close-up of Specimens 1-2-4.*



flow of the sheet into the die shape.

This constant trial and error experience finally results in a fully formed fender. Constant adjustments have been necessary in the dies, pads, and blanks, in order to finally produce this finished fender. Sometimes the die alignment has been found unsatisfactory, and consequently a new set of quarter-size dies is made with improved alignment.

When satisfactory quarter-sized fenders have been developed, supervision is ready to release the production of the full-size dies. The details of these full-sized dies are based on the development of the small dies, and all the details are incorporated into the final production dies.

During the final stage of the blank and die development on the quarter-sized models, blanks with longitudinal and transverse grid lines scribed ¼" apart are formed into fenders. The final elongations are charted, and the increase in elongation is studied and measured. These values indicate the nature of the depth of draw and if it is excessive beyond the practical limits of production, further developments are made to reduce this elongation to within practical production limits. This elongation is identical to those described in the latter part of this report.

Although the preliminary development work has been accomplished on the small dies, another period of development is necessary when the production dies are set in a press to spot the dies and adjust the pad pressures with the proper clearance before production can begin on the full-size fenders for manufacturing.

*Fig. 3. Experimental dies of Cerrobend,[1] the alloy adopted recently by research engineers of the Ford Motor Company. The female die (left) and the male die are immersed in liquid $N_2$, cooled to 320 degrees below zero, and then subjected to a pressure of 10,000 pounds to produce stampings like those shown below.*

Of interest to die design engineers is a recent development at the Ford Motor Company for the application of a soft alloy of bismuth, tin, and lead used in making small experimental dies for sample parts.

In the past, experimental engineers have had to wait from six to eight weeks for small steel dies to be made. Soft metal dies are now produced and sample parts obtained within 24 to 48 hours.

The alloy will melt in hot water, and ordinarily it is too soft to stand the tremendous pressures imposed on dies.

The experimental die is easily cast and worked to the desired size and shape. By subjecting it to liquid nitrogen and hardening the die by freezing it to 320° F. below zero it can withstand pressures satisfactory for forming small parts.

The die can withstand a pressure of 10,000 lbs without distortion. From six to ten stampings can be secured between chillings in the frigid bath.

It requires the teamwork and understanding and cooperation of many men to produce designs, dies, and steel for efficient production, because these functions are not one-man jobs.

The second section of this paper will describe the application of cold rolled sheet steel for deep drawn parts and the controls used in the press shop for the production of deep drawn stampings.

A great demand for rolled steel sheets was made by the automotive industry as mass production methods were employed. The cold rolled sheets from the now obsolete hand mills were applied successfully during the early days of automobile manufacturing when streamlining was still unknown. However, as the auto body designs became more and more intricate, with contoured parts requiring deeper drawing steels, the use of the hand rolled sheet became restrictive for efficient production. Fortunately,

at this time the development of the continuous hot and cold rolling mills proved successful, and cold rolled sheets with greater drawing properties were produced.

While the metallurgical properties of cold rolled steel were being developed on the modern continuous cold rolling mills, it became necessary also to develop suitable controls in the press shop for high quality performance.

It has been usual in the press shop to indict the steel at the first sign of trouble in a stamping operation. Before declaring the steel guilty it is necessary to evaluate both the properties of the steel and the mechanics of the stamping operation for the determination of the cause of poor performance.

The first cry usually heard in the press room is, "The steel is no good; take it off the job; it won't form!" It takes a very skillful diplomat and a good practical technician to enter the scene at this time. When the mill contact man, called in a day or so later, walks into this type of situation, he is unfamiliar with the immediate history of the die operation or the quality background of the steel. He must immediately observe the operating conditions, which may have changed, and have the reluctant operators run a trial lot of his steel to determine what is wrong.

After exhausting all possible methods of using the steel, he usually obtains samples of the steel in question and also of competitive material which is performing satisfactorily. Upon obtaining the background of the steel in question and the test results from his mill on the steel specimens, he must determine the contributing cause of the non-performance of the steel. If he finds that the physical tests are satisfactory, he has the difficult role of attempting to convince the press operators that this is so.

Like all other steel mills, the steel division at the Ford Motor Company controls the release of cold rolled sheet steel for deep drawn parts by process specifications and final quality tests. However, the variations in the many processing steps for the production of cold rolled sheet steel have made the control by specification a difficult one. Consequently, the final tests cannot discover every hidden processing error which might affect the final performance of the steel.

These quality factors are divided into two broad groups: surface quality and internal quality. A brief outline of the various operations which influence each group is as follows:

**Surface Quality**

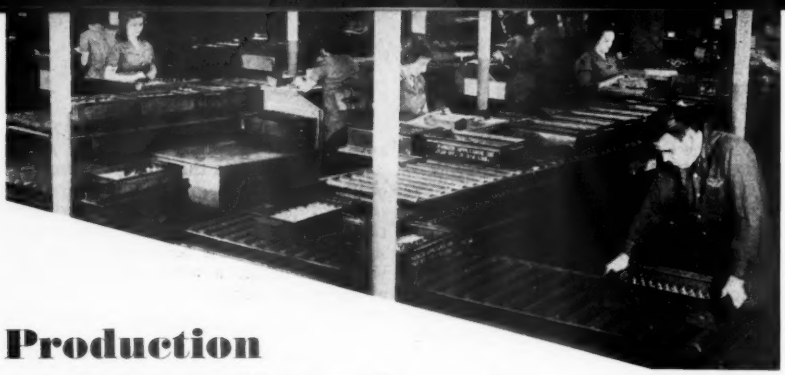
1. Open Hearth: improperly rimmed heats.
2. Pouring Practice in the Open Hearth: cold heats, poor pouring.
3. Mold Condition: cold molds, uncoated or dirty molds.
4. Soaking Pit Heating: excessive and irregular heating.
5. Rolling on the Blooming Mill: excessive drafts.
6. Slab Conditioning: rough torch scarfing, missed defects.
7. Reheating in the Rust Furnace: overheating.
8. Hot Rolling on the Hot Strip Mill: scale drags, scratches.
9. Continuous Pickling: excessive pickling or hard scale removal.
10. Cold Rolling: surface of rolls.
11. Annealing: poor atmosphere control.
12. Skin Passing: irregular and under tempering.
13. Handling: scratches and pits concealed by cold rolling.

**Internal Quality**

1. Steel Quality from Open Hearth: chemistry and cleanliness of the steel.
2. Proper Soaking in the Pits to reduce segregation.
3. Proper Discard to remove excessive segregation and pipe.
4. Proper Rolling Temperatures on Hot Strip Mill to produce uniform grain size.
5. Annealing Temperature and Cycle to obtain desired ductility.
6. Proper Tempering.

Therefore, close observation of each processing operation by the mill metallurgical department is extremely necessary to avoid any of the above factors which would influence the final drawing quality of the steel.

*(TO BE CONTINUED)*



# Production Inspection of Valve Parts

The extensive line of manually operated and motorized fuel selector valves, manufactured by The Parker Appliance Company, Cleveland, Ohio, presents many and varied inspection problems.

These valves are required by the many combinations of multi-tank arrangements in aircraft fuel supply systems. Positive indexing, low and uniform turning torque under extreme operating conditions, and leak-proof construction, are the operating requirements of these valves which demand that the prescribed accuracy of all machined parts be subject to rigid inspection.

The Parker Appliance Company's Inspection Department is divided into five divisions: Purchased Parts Inspection; Raw Stock Control Inspection; Production Inspection; Piece Part Final Inspection; and Assembly Test and Final Inspection.

*Fig. 1. A group of Parker Selector Valves showing typical arrangements of hose, tube and I.P. outlet adaptors.*

### Production Inspection

Production Inspection begins with checking the tooling setups for acceptance or rejection by the floor inspector. Accepted setups are recorded on the daily inspection report.

Machine operators make random checks of workpieces as the run progresses, thereby catching any defect which might develop due to tool displacement, tool dulling, or any other cause.

Hourly, piece parts are collected from the production machines and inspected for dimensional accuracy of each operation. Thus, rejectable piece parts are held to a minimum.

The same types of inspection instruments are used by the machine operators as are used by the inspectors in the piece part inspection and final inspection.

### Selector Valve Parts Inspection
### Body

A group of selector valves, illustrating the hose, tube, and I. P. inlet and outlet adaptors, is shown in Figure 1. An exploded view of the parts of one type of Parker Selector Valves is depicted in Figure 2.

The body (1), Figure 2, is an aluminum forging having a finished bore of $2.624'' \begin{smallmatrix}+.001\\-.000\end{smallmatrix}$ arrived at through drilling, rough boring, semi-finish boring and

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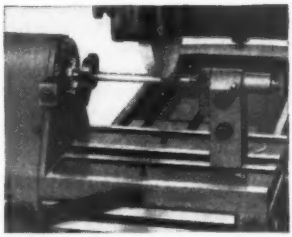
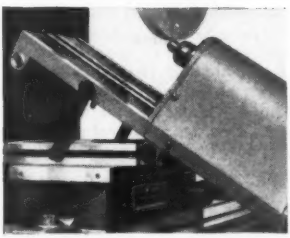


Grinding work held between centers. Tailstock center easily withdrawn for work change.



Angular grinding of work held in spring collet. Attachment mounted on permanent magnet chuck.

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Straight cylindrical or tapered work is ground between centers or, if ½" diameter or less, can be held in indexing spring chuck. Indexing is performed with headstock index plate or with interchangeable spring chuck.

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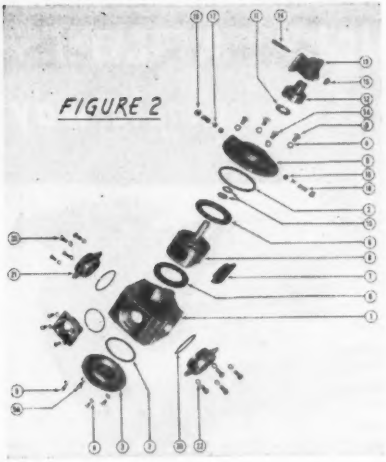



*Fig. 2. An exploded view of the parts of the Parker Type E selector valve.*

finish boring. Each operation is checked as performed. The semi-finish bore (2.612" $^{+.002}_{-.000}$ diameter) is checked with a Standard Gage Company's dial bore gage.

The finished bore must have no taper or bellmouth, out-of-round must not exceed .0002", and the diameter (2.624") held to a $^{+.001}_{-.000}$ tolerance. These conditions are checked by the air gage method with a Sheffield Precisionaire, whose float reacts instantaneously to the slightest deviation such as a low spot, high point, tool mark, taper, bellmouth or out-of-round condition in the part being checked.

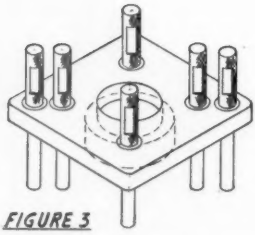



*Fig. 3. Pin gage for checking spacing and depth of top and bottom cap attaching holes.*

The valve body top and bottom surfaces have holes drilled and tapped for attaching caps (3 and 9), Figure 2. In addition to checking the tapped holes with a thread gage, the spacing and depth of these holes are inspected with a pin gage, Figure 3. The number of these holes varies, depending on the size and type of valve. Accordingly, the gage will have the same number of pins as there are holes to be checked.

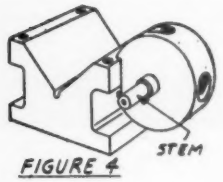
Three mounting holes drilled through the body and four drilled and tapped port adaptor attaching holes are checked for spacing with pin gages similar in construction to that shown in Figure 3.

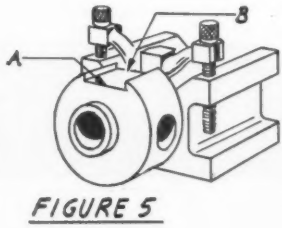
Four port counterbored holes, into which the port adaptors and seals are assembled, are checked with plug gages and the 20 RMS specified surface smoothness read with a Brush Analyzer.

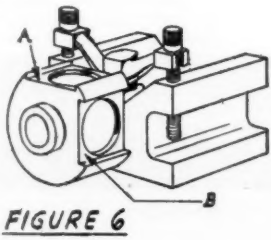
**Rotor**

The finished rotor (8), Figure 2, turned from 2⅝" aluminum bar stock, has a 2.594" body diameter and a .400" stem diameter. One or two slots (depending on the type of valve) are milled on the

*Fig. 4. Rotor set on "V" block for checking concentricity of slots with stem. Fig. 5. Rotor held by stem in "V" block for gaging taper of slot. Fig. 6. Rotor clamped on "V" block for checking angular relationship of 90° slots.*



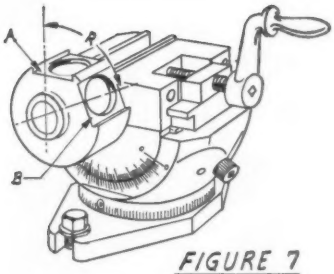



FIGURE 7

*Fig. 7. Rotor held by stem in angular vise for checking angular relationship of 72° slots.*

periphery with two counterbore holes bored in the bottom surface of the slots. Three $\frac{1}{8}$" diameter holes, drilled on the periphery to the centerline, form a "Y" pattern.

The relationship of the slots, counterbores and drilled holes to each other and to the centerline of the rotor are checked as follows:

I. Milled Slots.
   a. Concentricity of slots with stem.
      1. Rotor is set on edge of "V" block as shown in Figure 4. Concentricity is determined by indicating the stem with a dial indicator in the first position, the rotor is then re-positioned 180° and the stem indicator reading repeated. An allowable difference in dimensions between slot edges and stem centerline is .005" total indicator reading.
   b. Longitudinal taper of slot.
      1. Rotor is held by the stem in a "V" block, Figure 5. By moving the contact of the dial indicator from A to B, the taper on the milled flat is determined. Allowable taper is .003".
   c. Angular accuracy of 90° slots.
      1. The rotor is held by the stem either in a "V" block or dividing head as shown in Figure 6. The bottom of slot (A) is leveled by means of the indicator. The "V" block is then turned 90° and the bottom of slot (B) indicated. A taper of .008" in one inch length is allowed.
   d. Angular accuracy of 72° slots.
      1. Rotor is placed in an angular vise (held by the stem) as shown in Figure 7. The bottom of slot (A) is leveled with the indicator, the vise is then rotated to the specified angle (R) and the bottom of slot (B) indicated. A .008" taper per inch length is allowed.
   e. Depth of milling to centerline.
      1. The bottom of the rotor slot is located on a gage block as shown in Figure 8. The dimension from the bottom of the slot to the centerline of the stem (1.000") is checked by setting the dial indicator contact at the required height over the stem and indicating the stem to the specified tolerance of ±.002.

II. Concentricity of Counterbore to the Milled Slots and Depth of Counterbore.
   a. A special concentricity gage, Figure 9, has been developed at Parker for checking the concentricity of the counterbore to the milled slot. An adaptor (A), Figure 9, whose stem screws into the gage fixture, is inserted in the counterbore. Readings are taken on a dial indicator clamped to the fixture, first on one edge of the slot and then on the other edge as the rotor is

*Fig. 8. Gage block and indicator used for checking depth of milling to centerline. Fig. 9. Special gage for checking concentricity of counterbore to the milled slots. Fig. 10. Setup for checking depth of counterbore.*

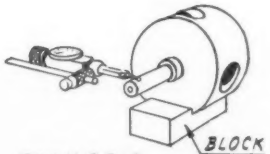



FIGURE 8

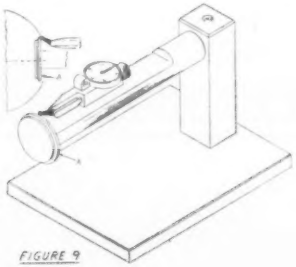


FIGURE 9

FIGURE 10

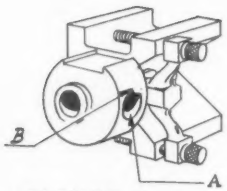



FIGURE 11

*Fig. 11. "V" block for checking concentricity of drilled holes to body.*

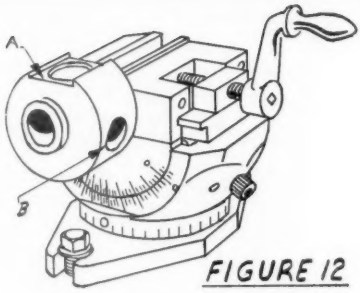



FIGURE 12

*Fig. 12. Angle vise and rotor setup for checking angularity of drilled holes to milled slots.*

revolved through 180°. A variation of .010" total indicator reading is allowed.

b. Depth of counterbore.
The bottom of the counterbore is specified as .872" $^{+.005}_{-.001}$ from the center of the rotor. To check this dimension, a round block, Figure 10, is inserted in the counterbore so that it rests on the bottom of the counterbore. The indicator contact is set to the required height over the stem. The stem is then indicated for a tolerance of +.005, —.001.

III. Concentricity of Drilled Holes to Body.
To check the concentricity of the $\frac{1}{16}$" diameter drilled holes to the body, the rotor is held by the stem in a "V" block and leveled up along the drilled holes (A), Figure 11, with a dial indicator. The "V" block is then rotated 180° and the hole indicated at (B). A .010" total indicator reading is allowed.

IV. Angularity of Drilled Holes to Milled Slots.
Checking the angularity of the drilled holes consists of holding the rotor by the stem in an angle vise with the milled slot facing up, see Figure 12, and leveling up the bottom of the milled slot (A), with a dial indicator. The angle vise is then rotated to the specified angle (72°), and the hole (B) indicated along its length. A taper of .008" per inch is allowed.

### Top Cap

The top cap (9), Figure 2, is machined from either a forged aluminum blank or aluminum casting. Extreme accuracy must be maintained between the location of the drilled mounting holes and the ball indexing ports. The centerline of the port must line up with the vertical centerline of the top cap.

Checking this relationship is performed by placing the top cap on the gage shown in Figure 13 and passing the gage pins (A) through the ball indexing ports and gage bore (B). Failure of the gage pins to pass through both openings indicates a rejected workpiece.

### Port Adaptors

Spacing and diameters (.201") of mounting holes drilled in port adaptors (21), Figure 2, are checked by a special functional gage shown in Figure 14. External threads of the tube port adaptors, Figure 1, are checked with a Johnson Thread Gage. Adaptor is set in thread gaging anvil and reading taken directly on dial indicator.

*Fig. 13. Gage for checking angularity of centerline to ports.*

FIGURE 13

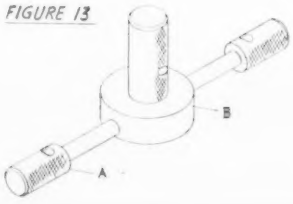



*Fig. 14. Spacing and diameters of mounting holes checked with a functional gage.*

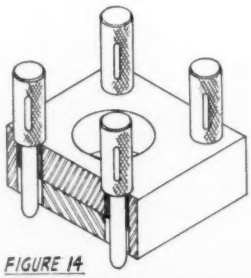


FIGURE 14

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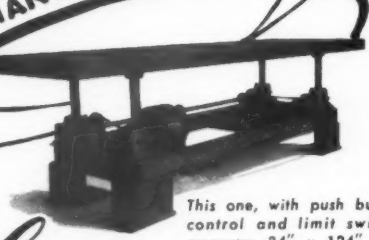

*This one, with push button control and limit switch, measures 34" x 124" and has a capacity of 10,000 pounds.*

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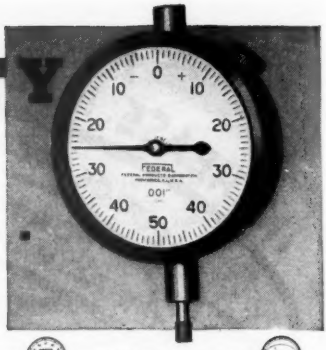


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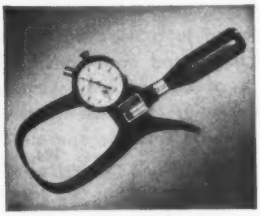

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SEE ADVERTISERS INDEX, PAGE 71, FOR KEY NUMBERS

by Hans Effgen
*Mechanical Engineer*
*Globe Tool & Gage Works*
*Boston, Massachusetts*

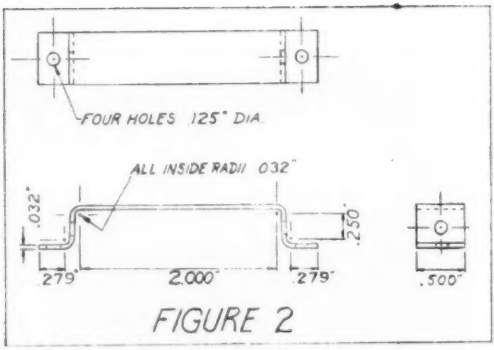

FIGURE 2

# Die Design for Symmetrical Brackets—*Part II*

The first article of this series described the construction of two-station progressive dies for producing the types of symmetrical brackets such as those shown at "A" and "B", Figure 1. This article will illustrate the design and construction for dies of the type which produce symmetrical brackets similar to that of "C", Figure 1, and will also present a continuation of a general discussion of design theory as related to the case at hand.

The bracket at "C", Figure 1, is detailed dimensionally in Figure 2, and the die which produces this part is illustrated in Figure 3. Figure 2 has been dimensioned in such a manner as to allow determination of the developed length without needless calculation.

Cold rolled steel strip .032" thick and approximately 3⅝" wide is the size of the work strip passed through the die in the production of the part, the stock being supplied in coils. Referring to Figure 3, it can be seen that a side notching punch has been incorporated as a first station.

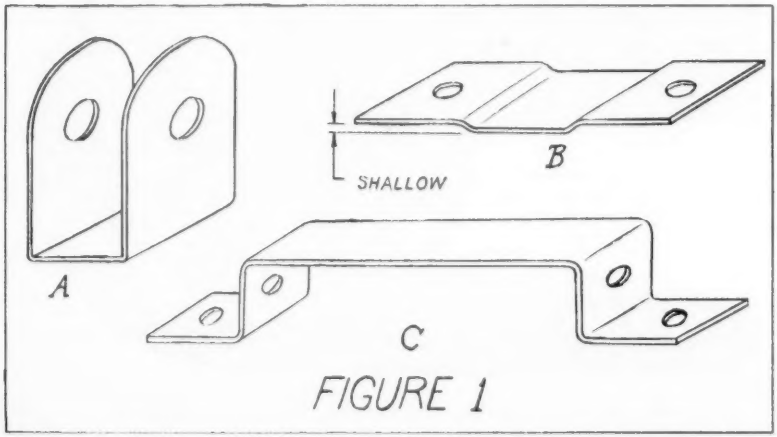

FIGURE 1

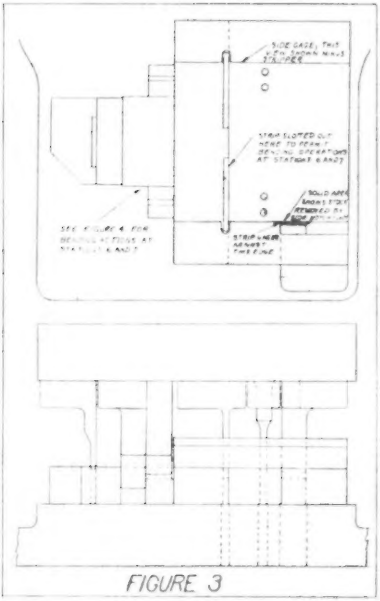

FIGURE 3

this punch being utilized to cut the strip to the exact developed width required to produce the part to its specified tolerance. This punch also notches the work strip to a length which is equal to the center-to-center distance between stations. The right-angled notch thus produced in the strip is fed against the leading edge of the front side gage which acts as a stop.

The four holes required in the part are pierced at station No. 2.

A slot is notched out of both sides of the strip at a point equidistant from the centers of stations No. 3 and No. 4 to permit the bending operations which take place at stations No. 6 and No. 7. This bending action and its sequence are shown in Figure 4.

The completed part is severed from the strip at station 8 by a parting punch containing a "heel" at its extremities. These "heels" enter the die ahead of cutting edge and serve as pilots to locate the work strip as well as to keep the punch from whipping. This type of construction is sometimes preferred to that where the ends are freed by slitting, as it tends to eliminate the fin which is common in parts produced by the latter method, particularly with the type of part shown in Figure 2.

A sketch of the work strip is illustrated in Figure 5.

The developed length for this part is computed by assuming that the neutral bending point is one-third the stock thickness from the inside bend. This assumption is made on the basis of two determining factors: one, that the bending performed is essentially that of a "V"-type bend, and two, that the bending radius is less than twice the material thickness.

The formula for the calculation of the bend allowance for one 90° bend, with the qualifications stated here and in Figure 4 will reduce to:

$$(t/3 + R) \times 1.5708.$$

It is of interest to note at this point that some sources give formulas for computing allowances for this type of bend which vary from that given above. The formula given above is used by many manufacturing concerns because it is concise and has been found to give a good degree of accuracy when properly applied. Any formula used, however, should be tempered with consideration

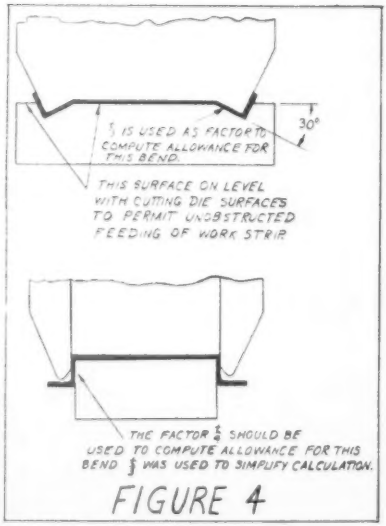
1/3 IS USED AS FACTOR TO COMPUTE ALLOWANCE FOR THIS BEND.
30°
THIS SURFACE ON LEVEL WITH CUTTING DIE SURFACES TO PERMIT UNOBSTRUCTED FEEDING OF WORK STRIP
THE FACTOR 1/2 SHOULD BE USED TO COMPUTE ALLOWANCE FOR THIS BEND 1/3 WAS USED TO SIMPLIFY CALCULATION.

FIGURE 4

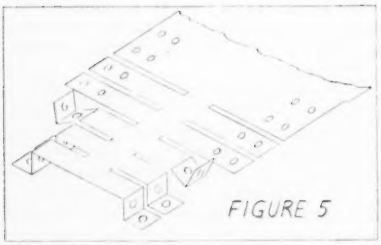

FIGURE 5

of the many variables present.

The most important variable, it seems, is the actual type of bend which is performed. For instance, in a double bend spring pad die, authorities state that the neutral bending line is approximately one-fifth the material thickness from the inside bend. For a die in which one end of the work strip is wiped down over the face of the die, the factor is one-fourth, and for a "V"-type die the factor is one-third, as has already been mentioned. Other factors which influence the developed length, but not to such a degree as the type of bend, are listed below:

1. Type and thickness of material
2. Type of edge over which material bent
3. Radius to which the material is bent
4. Minimum radius obtainable is about five percent of the stock thickness.

In computing the developed width of the blank, the straight portions of the part indicated by "X", "Y", and "Z", Figure 6, are first determined; and since the four bends are equal, and the part symmetrical, the complete formula will be as follows:

$2X + 2Y + Z + 4(t/3 + R) \times 1.5708$

Substituting the values from Figure 2, we have: $2 \times .279'' + 2 \times .250'' + 2.000'' + 4(.032''/3 + .032'') \times 1.5708$, which equals 3.326". Distances between centers for hole location in the flat are

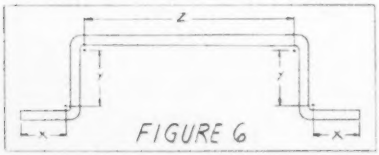


FIGURE 6

determined in the same manner.

Where tolerances required are not fussy, the developed length as determined from the formula may be directly resorted to without further check. In one instance where a group of dies of the same type was built, the actual developed length varied .001" from the computed developed length, the bend occurring across the grain of the material. The difference in the two developed lengths was .003", however, when the bend was made with the grain. Varying the amount of "hit-home" in one of these dies altered the dimensions as much as .025". This, however, is attributable to variations in the radius of the bend.

Where the tolerance of the bend is strict, one of two courses of action is usually followed.

In the first case, narrow test blocks are made to simulate the bending action as it would occur in the die. Figure 7 illustrates a set of test blocks used to determine the developed length of the bracket shown in Figure 2. These test blocks are duplicated when the die is built.

The second, and perhaps the better of the two methods, is that of building the forming stations into the die first and determining the developed length from

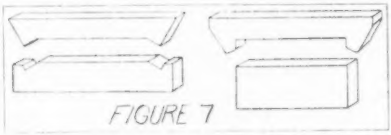

FIGURE 7

them before incorporating the piercing and the two notching stations. The latter method is sometimes preferred since exact duplication of the test blocks is necessary in the first method, and error in duplication is possible.

The over-all clearance between punches and die for the die of Figure 3 is 5 percent of the material thickness to be cut. If the part of Figure 2 were made of a harder material the clearance would be increased, even though harder materials require less clearance for a clean fracture. The practice of increasing the clearance as the hardness of the material increases is a good one since it acts

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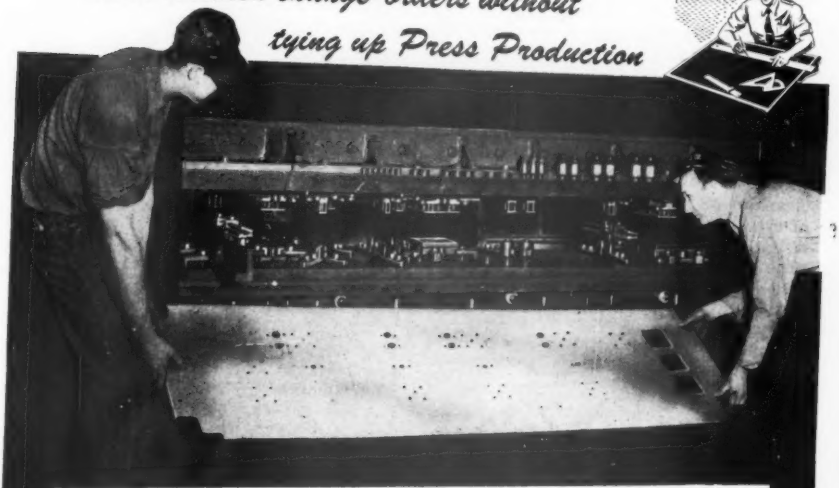

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to reduce the load on the cutting edge, and materially aids in preventing rapid deterioration of the cutting edge.

That proper clearance is necessary if the die is to produce the maximum amount of parts between grinds is shown in Figure 8. At "A" is shown the type of fracture which occurs when the clearance between the punch and die is sufficient. At "B" is shown the fracture which occurs when there is not enough clearance between punch and die. Start of a secondary fracture can be seen, and it is obvious that this fault in design is seriously detrimental to die life and will also increase the piercing pressure necessary to punch out the slug.

The adherence of slugs to punches in the operation of progressive dies such as those being described is particularly

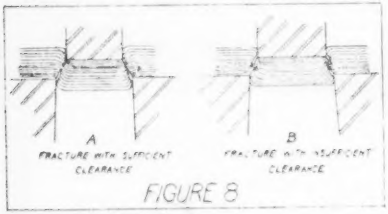

FIGURE 8

troublesome. Slugs often fall under the work strip causing product distortion and punch breakage. Together with inaccurate gaging and the necessity of removing these slugs from the die, it can be realized that production is considerably slowed down. A sharp die which produces a cleanly cut slug, smooth surfaces in the die, together with lubricant on the work strip, act to bring about this condition. The lubricant creates an adhesive film between the slug and the face of the punch—a condition approximating that of a vacuum. As the punch retracts from the die, the slug rises with it.

Where the punch is large enough, push-off pins can be incorporated which act to break the oil seal and make it easier for the die to retain the slug. Should the punch be too small to allow the installation of such pins, small indents are ground or stoned into the face of the punch to act as vacuum-breakers, as shown in Figure 9.

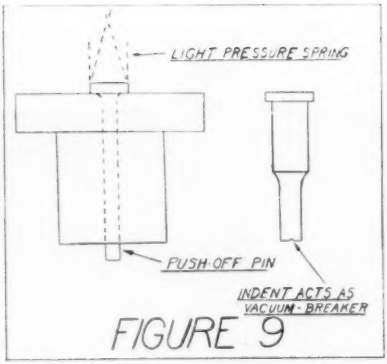

FIGURE 9

In the parting punch for the die which produces the bracket shown in Fig. 2, slug adherence is prevented by grinding the face at two alternate angles so that each end of the slug is twisted against the die and clings to it. Figure 10 shows this construction. The parting punch can be made approximately .002" smaller than the waste cut since the part is slightly coined in the bending stations.

In the last installment of this series, construction of dies for symmetrical brackets with bends in two planes will be discussed. Though these dies are in themselves quite simple, the principles which are observed in their construction are often overlooked when dies of a more complicated nature are being designed and built, and the statement "it's the little things that make the big things go" is one that should be remembered when the task is undertaken.

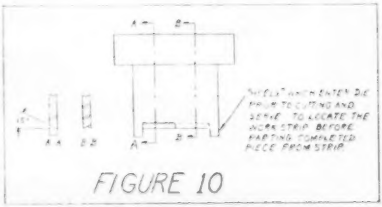
FIGURE 10

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*"Plastic Working in Presses", by E. V. Crane, John Wiley & Sons, Inc., New York, N. Y., 1944.*

*The signing of the Declaration of Independence of the United States of America. July 4, 1776*

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SEE ADVERTISERS INDEX, PAGE 71, FOR KEY NUMBERS

# Die Casting Die Design

## *Part II: Cores*

### Introduction

Die castings and pressure moldings may be produced with extensive coring. Such coring is advantageous to the purchaser of the casting (or molding) and to its producer.

One of the greatest challenges to the die designer is to design dies for parts calling for extensive coring at low cost. Indeed, the ingenuity the designer displays in designing his dies determines not only the cost of the dies, but the efficiency and, therefore, the expense of operating the die in service.

**by H. K. Barton**
**and**
**James L. Erickson**

The fact that die castings and pressure moldings can be extensively cored accounts for the great popularity of these two types of castings.

Irregularly shaped holes can be readily cored. Such holes might otherwise have to be produced by costly machining operations such as broaching, shaping, or hand filing. The coring of many shapes is commonly required by the product designer. Some of the most frequently called-for shapes are square, hexagonal (for the reception of lock nuts), round holes with keyway slots, gear forms at the bottom of blind holes, splining (also in blind holes) and many types of clearance holes and ventilation spaces.

By carefully designing the die, it is possible to core nearly all desired holes which are greater than $\frac{1}{16}$" dia. for zinc base alloys and $\frac{3}{32}$" dia. for aluminum base alloys. Actually, from the point of view of the caster, it is preferable to core as many medium-sized holes as possible. This has the effect of breaking up thick sections which, if unrelieved, might be a cause of the formation of porous areas, or might reduce the operating cycle by reducing the rate of cooling for a given section. The size of the smallest hole which may be cast depends upon the alloy and the design of the die (Table I).

Not only can holes be cast in, but also cavities and recesses can be produced by the aid of sliding cores, or core blocks. It is, however, desirable to avoid designing dies which have cores to be pulled in too many directions.

**APPROXIMATE DIMENSIONAL AND WEIGHT LIMITS FOR DIE CASTINGS IN DIFFERENT ALLOYS**

Data apply to average conditions. For exceptional conditions, larger castings, closer dimensional limits and thinner sections may be feasible.

| TYPE OF ALLOY (base metal) | ZINC | ALUMINUM | MAGNESIUM |
|---|---|---|---|
| Maximum weight of casting, lb. | 35 | 20 | 10 |
| Minimum wall thickness, large castings, in. | .050 | .080 | .080 |
| Minimum wall thickness, small castings, in. | .015 | .050 | .050 |
| Minimum variation from drawing dimensions per inch of diameter or length† | .001* | .0015* | .0015* |
| Cast threads, max. no. per in. external | 24 | 24 | 16 |
| Cast threads, max. no. per in. internal | 24‡ | none | none |
| Minimum draft on cores in. per in. of length or diameter | 003 | .010 | .010 |
| Minimum draft on side walls in. per in. of length or diameter | .005 | .010 | .008 |

*Depends on conditions.
†Larger variations may be anticipated across die partings or where fits of slides or cores are involved
‡Where cheaper than tapping

TABLE I

*Courtesy New Jersey Zinc Co.*

### Directions of the Core Pull

In general, the ordinary die casting dies are rigidly mounted on the two die platens of the die casting machines (Figure 1). The two die platens, A and B, in turn are mounted and guided in their movement by tie-bars, T, which pass through the two platens. As explained earlier in this article, one of these two platens, B, is fixed, or stationary, and the other, A, is movable; its motion to and fro is accomplished either hydraulically or mechanically. At all times the faces C and C′ of the two die platens, A and B, onto which the two die casting die halves are mounted, remain parallel to one another; thus the two die halves, X and Y, are always brought together and opened with a motion whose direction, B-B′, is normal, or perpendicular, to the faces of the two die platens. This condition of die opening and closing imposes certain restrictions on the manner in which the die casting may be designed, e.g., the die casting die components, such as its stationary cores, must be so situated that they do not prevent the free opening of the die.

The direction of die opening, B-B′ is always normal, or perpendicular, to the die platen faces, or to put it another way, it is the same as the direction of the movable die platen motion, A-A′.

Die casters frequently refer to the "plane of die parting". They mean by this a plane, F, which is perpendicular to the direction of die opening. It corresponds, in the case of the ordinary die casting dies, to the plane in which the seal-off faces, D and E, of the two die casting die halves, X and Y, lie when the die is closed; however, it is not to be confused with the planes H, I, and J, in which the die cavity face lies.

The seal-off face of any die casting die (there are exceptions) is generally parallel to the plane of die parting, while the face, or faces, of the actual die cavity need not be parallel to the plane of die parting. Strictly speaking there is no such thing as a *die cavity face plane*, for the actual cavity face may consist of literally myriads of planes, none of which have any significance in the present discussion.

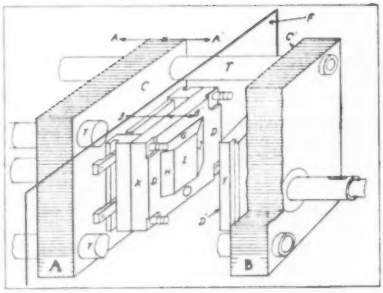


*Fig. 1. Arrangement of platens and dies in a die casting machine.*
*A = Movable Die Platen*
*B = Stationary Die Platen*
*C = Face of the Movable Die Platen*
*C′ = Face of the Stationary Die Platen*
*D = "Shut-off Face" or "Sealing-Face" of the Movable Die Casting Die Half*
*D′ = "Shut-off Face" or "Sealing-Face" of the Stationary Die Casting Die Half*
*F = Plane of Die Parting*
*H, I, and J = Faces of the Die Casting Die Cavity. I is parallel to the plane of die parting and the "Shut-off Face" of the die.*

In the ensuing text, reference will be made to the "plane of die parting"; therefore, the reader must bear in mind that reference is being made merely to the plane F, Figure 1, which is a plane perpendicular to the direction of die opening B-B′, Figure 1.

### Types of Cores

In general there are two types of cores: stationary and movable.

All stationary cores must pull-out of the die cast part freely as the die is opened and the die casting is ejected from the die cavity of the movable die half. It is therefore essential that outer walls of the stationary cores be either parallel to the direction of die opening, or inclined at such an angle as not to prevent its free withdrawal from the die cast part.

Stationary cores may be situated on either the stationary die half or the movable die half; it is customary however to locate any necessary stationary cores on the movable half. This is done because the molten die casting alloy shrinks in solidifying, and in subsequent

cooling it tends to shrink onto the cores rather tenaciously. If the cores were located in the stationary half of the die, the die casting would not pull away freely from the stationary die half as the die is opened, with the result that a defective, distorted, or even cracked die casting would be produced. To avoid this undesirable situation, stationary cores are best located in the movable half of the die, for then the die casting formed tends to shrink onto the stationary cores and "hang", so to speak, on the movable die half, from which it is subsequently ejected by means of ejector pins.

When it is necessary to locate one or more stationary cores in the stationary die half, the walls of the core should be sufficiently tapered so as to permit the die cast part to pull away easily from the core.

Stationary cores that must possess a minimum draft, and which are over .025" long (in the direction of die opening), should be located in the movable die half.

Movable cores are used whenever it is necessary to core holes in a die casting when the hole axes do not lie parallel to the die opening direction. If the cores to produce such holes were stationary, they would prevent the actual opening of the die and, in addition, the casting would be damaged in attempting to open the die. Danger of damage to the core would also be present. Free ejection of the casting from the movable die half would be prevented, with resultant damage to the die casting and core. In other words, movable cores are merely cores which retract, or pull out of the die casting, to permit free opening of the die and/or free ejection of the die cast part.

Occasionally a core whose central axis lies parallel to the direction of die opening is made movable to enable it to retrace from the die casting, or even to enable it to actually eject the die casting; however, movable cores are generally employed only when it is necessary to withdraw the core from the die cast part to permit free die parting or free ejection of the part from the die.

### Fixed, or Stationary Cores

Fixed or stationary cores may be of various sizes or shapes. They may be employed merely as "metal savers" or they may be employed to "core in" square, irregular, or round shaped holes. When they core shallow holes of large cross-section, they are generally integral with, or a part of, the main cavity block. However, when they core deeper holes, they are generally made up as separate pieces and inserted into the main cavity block (Figure 2). The reason for this is twofold: (1) long projecting cores, if made integral with the main die block, would necessitate the waste of considerable expensive die steel and die making

(CONTINUED ON PAGE 90)

*Fig. 2. A typical fixed core installation. The core is designed for easy installation, repair, or replacement. Table II gives standard dimensions for the typical fixed core installation. Drawing courtesy of Johnson Motors.*

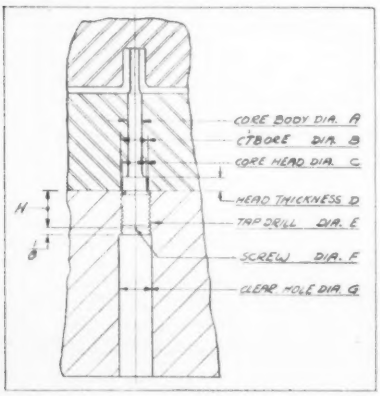


TABLE II

| DET | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1 | 1/8 | 1/4 | 1/4 | 1/8 | LET F | 5/16-18 | 21/64 | 7/16 |
| 2 | 5/32 | 5/32 | 5/32 | 3/16 | 5/16 | 5/16-16 | 25/64 | 1/2 |
| 3 | 3/16 | 5/16 | 5/16 | 3/16 | 5/16 | 5/16-16 | 25/64 | 1/2 |
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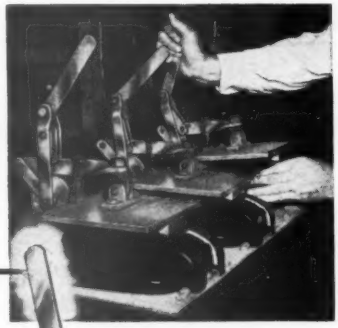
SAVE VALUABLE PRODUCTIVE HOURS

End Excessive Labor in Work Setups with

# DANLY Kwik-Klamp Toggle Clamps



**FOR USE WHEREVER POSITIVE HOLDING and CONTROLLED PRESSURES ARE REQUIRED**

Sharp reduction in work handling is made possible through the use of Danly Kwik-Klamps. Instead of using bolts, screws, c-clamps and other similar means for holding work, these toggle type clamps perform the same function better in a fraction of the time. Valuable productive hours are saved, work holding methods simplified.

Positive Kwik-Klamp toggle arrangement prevents loosening when the clamp is engaged. A simple movement of the handle engages the toggle link to apply holding pressure on the clamp bar. Twenty-six different sizes and styles of Kwik-Klamps have maximum holding capacities ranging, according to size, from 300 to 750 lbs.

**WHY KWIK-KLAMPS CUT PRODUCTION COSTS**

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You can profit by applying these clamps to your holding problems. Complete information will be furnished upon request.

**Profitable Kwik-Klamp Uses**

- For holding all types of work during fabrication and welding.
- For applying pressure on plastic parts during curing to prevent warpage.
- For holding units and parts during light machining operations.
- For positioning work during inspection and testing.
- For holding parts on assembly and layout tables.
- For countless other similar applications.

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**SOCKET HEAD STRIPPER BOLTS** precision made for better fitting—will not shear or strip.

**DIE SPRINGS** for complete range of die work—two types—medium pressure . . . high deflection, and high pressure . . . medium deflection.

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SEE ADVERTISERS INDEX, PAGE 71, FOR KEY NUMBERS

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## *to get the most out of every production dollar!*

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*NTDMA members are getting real help from our Special Bulletins on matters like "overtime-on-overtime" as it affects our industry. If you would like to see some of these Bulletins, you are invited to write our office for copies.*



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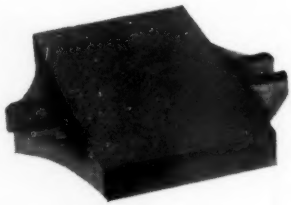

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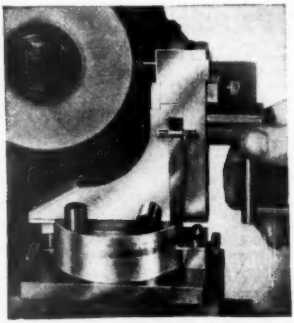

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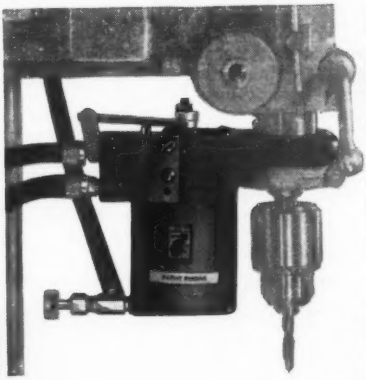

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This simple, inexpensive device quickly converts standard drill presses into semi-automatic machines—increases production, reduces operator fatigue, and does a more uniform job.

Clamps to spindle quill in a few seconds. Automatically closes air fixture on work. Adjustable feed control and break-through cushion. Quick return. Easy to synchronize with automatic cycle equipment.

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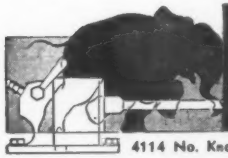

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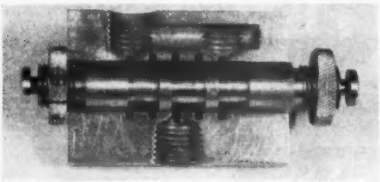
SPECIALTIES COMPANY
4114 No. Knox Ave., Dept. HA-118, CHICAGO 41, ILL.




SEE ADVERTISERS INDEX, PAGE 71, FOR KEY NUMBERS

# Hi-Cyclic Air Valves

A radically new development in air valves, which eliminates many of the undesirable features connected with the compressibility of air, has been completed by the Beckett-Harcum Company, Wilmington, Ohio. The Beckett Hi-Cyclic Valve (illustrated in the sectional view below) was designed primarily to fill the need for an accurate, fast, and smooth control for air power in automatic production work-feeding operations, and automatic control of drill



presses, milling machines and other production machines.

With this Hi-Cyclic Air Valve, an air cylinder stroke can be controlled to within one or two thousandths of an inch accuracy. Air consumption is in proportion to the work being done, regardless of the length of the cylinder being used. It is a 100% balanced valve which makes it adaptable for building into double solenoid-operated valves, wherein the solenoids do not have to hold but merely hit and are immediately de-energized.

The basic valve is a continuous reciprocating unit, having built-in directional speed control in both directions. It can be used as either a 3-way or 4-way valve, has only one moving part, and has no seals of any kind, such as leather, "O" rings, or washers.

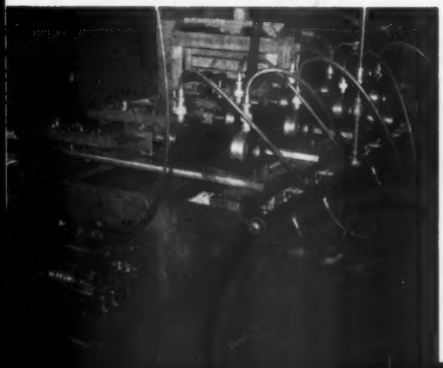
Characteristics of this valve are: instantaneous performance, since there is no lag time in starting; air pressure controlled in both ends of cylinder at the same time, enabling it to be used in many operations which have heretofore required the use of hydraulics.

The valve mechanism is constructed entirely of stainless steel and bronze, prohibiting trouble from rust or corrosion.

The illustrations at the bottom of the page show two views of a wire forming machine automatically controlled by Hi-Cyclic Air Valves. This particular machine forms heavy wire rims for refrigerator trays at the rate of approximately 60 pieces per minute. The automatic timing device, as well as the valves which are hung underneath, the air manifolding, cylinders and dies are readily seen.

Shown in the upper right-hand corner is an automatic power reciprocating unit, which is used quite widely for applications such as cleaning parts, shaking mechanisms, and sifting operations where a continuous reciprocating motion is required. Its speed can be varied from approximately 40 cycles to 1800 cycles per minute, with length of stroke from $\frac{3}{16}$" to full piston travel.

*Further information is available from the Beckett-Harcum Co., Dept. 85, 1140 Wayne Rd., Wilmington, Ohio, or circle Inform-A-Gram Key No. D48.*



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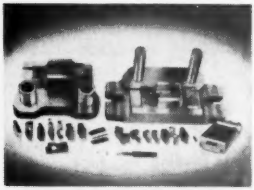
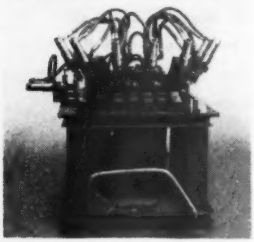
# BARKING UP THE WRONG TREE!





MANY A BUYER of tools, dies and special machinery who has followed the scent of low price has learned the hard way that it doesn't pay!

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You buy higher production . . . better production . . . faster production . . . lower cost production, all of which adds up to more profitable operation right down the line.

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## Keep Informed! CATALOGS • BULLETINS • SPECIFICATIONS

*Circle postage-free Inform-a-Gram Key Number for your request*

**THE RAAR "AIR FEED"** is a compact, easy-to-install automatic die feed, developed by Raar Manufacturing Company. A new bulletin has just been published describing the "Air Feed" in detail as to specifications and capabilities. The "Air Feed" fits all presses from 0" to 6", is simple to operate, and has a feed which is adjustable while in operation by the turn of a micrometer calibrated dial knob. Another new catalog just published by Raar Manufacturing describes the Raar interchangeable die sets for perforating metals, wood, and plastics. These die sets can be obtained with diameters up to 4". Photographs, specifications and construction details are included in this new catalog. Both bulletins are available at no charge by writing RAAR MFG. CO., INC., Dept. 24, 2024 W. Sixth St., Los Angeles 5, Calif., or circle **Inform-A-Gram Key No. B24.**

**THE CINCINNATI ALL STEEL SHEAR** has a very low rake or shear angle to the upper knife. This insures sheared strip with a minimum of twist, bow, or camber. It can cut ¼" mild steel 12' long accurately within a few thousandths of a 1/128" gauge setting. The usual twist in a very narrow strip is greatly reduced, or avoided entirely. These and many other features are described in detail in an attractive new catalog just off the press of The Cincinnati Shaper Company. Photographs of the machine, of job applications, and close-up views of the machine's parts are included in the catalog, which also explains how a great amount of work time is saved by the machine's accuracy, speed and ease of cutting. Send for your copy of catalog to THE CINCINNATI SHAPER CO., Dept. 630, Cincinnati, Ohio, or circle **Inform-A-Gram Key No. B26.**

**BERYLLIUM COPPER PRESSURE CASTINGS** for mild cavities and cores are presented in a new folder issued by Federal Tool Corporation. The molten metal is enclosed in steel and solidifies, while under pressure, to produce a very dense structure with a smooth surface and extremely good definition of design. Intricate designs, thin upraised sections, irregular shapes, and raised letters can have many cavities pressure cast from a single master or hob. Mold cavities and cores made by this process are at least Rockwell C45 all through, and have a compressive strength of at least 200,000 psi and a tensile strength of 170,000 psi. The brochure contains valuable information on heat treatment, machining, welding, soldering, brazing, plating, and pickling beryllium copper, as well as hob specifications. Send for your copy to FEDERAL TOOL CORP., Dept. 5, 3601 W. Pratt Blvd., Chicago 45, Ill., or circle **Inform-A-Gram Key No. B25.**

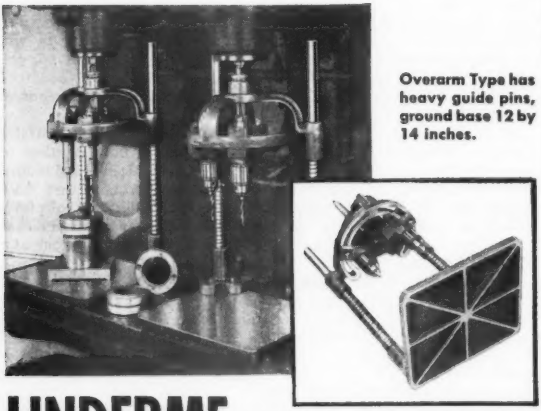
**D-M-E STANDARDS FOR DIE CASTING MOLDS** is the subject of a new catalog recently printed by Detroit Mold Engineering Company. The latest development and addition to the D-M-E standards list is a pinion ejector box of welded steel construction. They are approximately 30% lighter than cast iron, yet will stand up under the most severe use. Available in eight standard sizes, they are not limited to D-M-E standard blocks but can be used for all sizes. An ingenious device for holding the racks and pinions has been incorporated into the box. Pictures and full construction details are set forth in a new brochure, Vol. 6, No. 1, available by writing DETROIT MOLD ENGINEERING CO., Dept. 264, 6686 E. McNichols Rd., Detroit 12, Mich., or circle **Inform-A-Gram Key No. B27.**

**FOR LONGER CYLINDRICAL LAPPING SURFACE,** the Flexolap is offered in a new catalog by Acro Tool & Die Works. The Flexolap, designed by Federal Tool Corporation, is made with a series of longitudinal slots milled off-center to permit sensitively flexible expansion up to 15% or more under pressure of the adjusting pin. This construction enables Flexolap to save valuable time and to lap rounder, straighter holes. The barrel is available in either brass or steel, the lap shank is cadmium-plated, and the adjusting screw is of hardened steel. Full details and pictures are in the catalog which is available by writing ACRO TOOL & DIE WORKS, Dept. 595, 4554 N. Broadway, Chicago 40, Ill., or circle **Inform-A-Gram Key No. B28.**

## PUBLICATION PREVIEWS

**ABRASIVE BELT MACHINES AND PORTABLE ELECTRIC TOOLS** are described and photographed in a handy miniature catalog issued by the Porter-Cable Machine Company, Syracuse, N. Y. Included in the catalog are large abrasive machine tools with automatic feed tables, centerless belt grinders, toolroom surfacers and smaller, bench-type abrasive belt models. Backstand idlers are also illustrated. Specifications of each machine accompany the photographs and descriptions. The portable electric tool section lists saws, sanders, edgers and radial saws for use in woodworking, building, construction and allied industries. This colorful miniature catalog is available by writing PORTER-CABLE MACHINE CO., Dept. 14, 1714 N. Salina St., Syracuse 8, N. Y., or circle **Inform-A-Gram Key No. B86.**

**BRONZE DIE METAL** that is achieving records in lower production costs is featured in a new bulletin, No. 96, recently released by Ampco Metal, Inc., Milwaukee. The bulletin describes Ampco Metal Grades 21 and 22—well known for many years for forming and drawing die material—plus a new grade, 24, which, because of its unique intermetallic structure, effects great production economies. Many illustrations are scattered throughout the bulletin showing the different dies made from Ampco Metals. Also included are lists of hints on using Ampco metal dies; how to machine Ampco metal dies; and informative data on designing dies for efficient service. Bulletin No. 96 is available at no charge by writing AMPCO METAL, INC., Dept. 956, Milwaukee 4, Wis., or circle **Inform-A-Gram Key No. B89.**

**Overarm Type has heavy guide pins, ground base 12 by 14 inches.**

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This story is typical of the many applications of Linderme 2-spindle drill heads on long and short runs. You'll like these features: drills, taps —in metal, wood, plastics; quick, accurate adjustment, ½" to 6" centers; two minute set-up on most drill presses in your shop; anti-friction bearings, rugged gearing, quality machining—and Linderme's low initial cost for Overarm or Sleeve Types —Twelve models, capacities up to ⅝", available with G.M. Sleeves or Morse Tapers. Write for complete catalog.

**LINDERME MACHINE AND TOOL CO., INC.**

**12250 COYLE AVE. • DETROIT 27, MICH.**


**THE M-B AUTOMATIC AIR LINE FILTER** has been greatly improved upon since the war. In Bulletin No. 1007, M-B Products of Detroit illustrate and describe this new improved model. The head and base are made of duraluminum and machined to close limits. No castings or stampings are used. The bowl is made of transparent plastic, thus all foreign matter can be clearly seen and guesswork as to when the filtering element should be cleaned is eliminated. The plastic withstands temperatures up to 150°F, and a burst test of 500 pounds. Bulletin No. 1007 also contains a specification and price list. M-B PRODUCTS, 132 E. Larned St., Detroit 26, Mich., or circle **Inform-A-Gram Key No. B92.**

**MALL PORTABLE POWER TOOLS** are presented in a new catalog designed as a handy reference for tool users. Mall's complete line is illustrated with photographs which are accompanied with full construction and performance specifications. Catalag No. 746 is available free by writing MALL TOOL CO., Dept. 380, 7821 S. Chicago Ave., Chicago 19, Ill., or circle **Inform-A-Gram Key No. B93.**



PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION

**AJAX FLEXIBLE COUPLINGS** are presented in a colorful new catalog, No. 48, recently published by Ajax Flexible Coupling Co., Inc., Westfield, N. Y. The catalog covers the many types of Ajax flexible couplings—including standard Types S and A, as well as shear pin, brake drum, bolt-on, and detachable hub. Many photographs and drawings clearly illustrate the different types. There is also interesting data on forged steel and cast semi-steel construction. Capacities, dimension data and specifications cover the wide range of Ajax sizes. There is also a page explaining Ajax special couplings for use where it is impossible to connect two shafts in the usual manner. Send for Bulletin No. 48 to AJAX COUPLING CO., INC., Dept. 78, Westfield, N. Y., or circle **Inform-A-Gram Key No. B89.**

**"H-P-M SMOOTH LINE LABORATORY PRESS"** is a new 20 ton capacity, self-contained laboratory press which is described in full in a new bulletin released by The Hydraulic Press Mfg. Company, Mount Gilead, Ohio. The bulletin relates the practically unlimited applications of this new press. The laboratory technician can achieve many types of operations, including briquetting, tensile testing, extracting, molding, laminating, compression testing, etc. The bulletin includes photographs, drawings, and specifications of the new press. There are two pages devoted to a description of how the press works and illustrated with diagrams. Send for your copy to THE HYDRAULIC PRESS MFG. CO., Dept. 328, Mt. Gilead, Ohio, or circle **Inform-A-Gram Key No. B87.**

**A NEW IMPROVED LINE OF AIR-OPERATED WELDERS,** standard 30 and 50 KVA rocker arm, for high production spot welding, are presented in Progressive Welder Company's new Bulletin 702. These welders are suitable for a wide range of light-to-medium-duty applications. Eight different models are illustrated, described, and performance data and specifications for each are given. Send for your copy of Bulletin 702 to PROGRESSIVE WELDER CO., Dept. 146, 3050 E. Outer Drive, Detroit 12, Mich., or circle **Inform-A-Gram Key No. B94.**

**NEW LOW COST ELECTRIC TACHOMETERS** for all installations are presented in a new bulletin just off the press of Metron Instrument Company, Denver, Colorado. The Type 43 tachometer indicator is illustrated and its application and ranges and price are given. Five different models of Tachometer heads are also illustrated and their various applications explained. Drawings and technical data complete this folder. Send for your copy to METRON INSTRUMENT CO., Dept. 391, 432 Lincoln St., Denver 9, Colo., or circle **Inform-A-Gram Key No. B96.**


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SEE ADVERTISERS INDEX, PAGE 71, FOR KEY NUMBERS

## PUBLICATION PREVIEWS

**GEOMETRIC CLASS "S" COLLAPSING TAPS** are universal collapsing taps that can be used on most standard makes of machines without additional parts. Bulletin S-4, recently released by The Geometric Tool Company, New Haven, Connecticut, is an illustrated brochure presenting all the outstanding features of these taps. Four types of trip are provided—easily interchangeable. They are stationary and rotary-type plate trips, rotary-type sleeve trip, and hand or lever trip. These Class S taps are made of special alloy steel, hardened and ground. Drawings and specifications are included in the brochure which is available free by writing THE GEOMETRIC TOOL CO., Dept. 301, New Haven 15, Conn., or circle **Inform-A-Gram Key No. B3.**

**"DIESEL ENGINE MACHINING" AND "PROFILE MILLING"** are two very interesting and informative additions to Giddings & Lewis' Handbook on Horizontal Boring, Drilling and Milling Machines and their Application. Data Story No. 1 presents a treatise upon the various operations involved in diesel engine machining and is complete with charts, descriptions and illustrations. Data Story No. 2 is the case history of the machining of steel rolls for steel mill operations. These operations are described and illustrated in detail. Both of these data stories are punch-holed for notebook insertion and are available free by writing to GIDDINGS & LEWIS MACHINE TOOL CO., Dept. 43, Fond du Lac, Wisconsin, or by circling **Inform-A-Gram Key No. B2.**


**ON THE LEVEL**

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**3 SIZES**
No. 1—2" normal height
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**POSITIVE, ACCURATE MEANS FOR SETTING AND KEEPING MACHINES LEVEL IN A MERE MATTER OF MINUTES!**

Machine Tool Manufacturers strongly emphasize the need, not only to set machines level, but to keep 'em that way. Periodic re-leveling is essential for accurate work tolerances. How often, depends on the type of foundation. No method of machine setting is stable enough to maintain the accuracy of initial leveling. It is important to check after first month of operation, then check periodically and re-level whenever necessary.

When a machine is set on EMPCO JACKS, the whole operation is the work of but a moment: Simply apply a wrench to the "hex" screw head, turn right or left until your level indicator reads "zero."

EMPCO

**THE ENTERPRISE MACHINE PARTS CORPORATION**
2735 JEROME AVE. DETROIT 12, MICH.


**A NEW LINE OF FRICTION CLUTCHES** for industrial use is announced by Morse Chain Company, Detroit, in a new 12-page catalog, No. SDOC. These Morse-Rockford toggle-type, over-center clutches are adapted for use in a wide variety of installations. These clutches are available in capacities ranging from .5 hp to 1.7 hp per 100 rpm. The toggles are factory-assembled with the release mechanism and adjusting plate. Catalog SDOC is available by writing MORSE CHAIN CO., Dept. 60, 7601 Central Ave., Detroit 8, Mich., or circle **Inform-A-Gram Key No. B91.**

**RESINALL METALITE** is a new resin-bond dry-grinding belt recently announced by Behr-Manning in a new bulletin. Resinall metalite is made with an all-resin adhesive. Therefore, for any operation in which the high heat of cut may prematurely break down glue-bond belts, the heat-resisting qualities of resinall metalite will effect high production. The bulletin describes resinall metallite in detail as to uses, capabilities, etc. Send for your copy, plus a sample swatch, to BEHR-MANNING, Dept. 110, Troy, New York, or circle **Inform-A-Gram Key No. B90.**



PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION

**THE STANDARD SPINDLE NOSE,** taper key, has been adapted to all LeBlond engine type lathes for fast, accurate, and positive placement of lathe chucks, face plates and fixtures. This standard spindle nose is explained and illustrated in a new bulletin, No. SN-1, just off the press of The R. K. LeBlond Tool Company. The key drive, plus the revolving coupling collar, gives positive assurance that chucks and face plates will not fly off spindle nose regardless of speed of spindle. Accurate fittings can be maintained over a long period of time, and changing chucks or face plates is simple, easy, and fast. Many more advantages of this standard spindle nose are explained in the bulletin which is available by writing THE R. K. LEBLOND MACHINE TOOL CO., Dept. 359, Madison & Edwards Rds., Cincinnati, Ohio. **Inform-A-Gram Key No. 16.**

**THE NEW WINSMITH SPEED REDUCER,** featuring increased overhung load capacities, is announced in a new folder published by Winfield H. Smith Corp. This patented differential helical gear reducer has all the advantages of previous models —compactness, more teeth in action, larger reductions in a given space—with the added features of centered load distribution, more rigid and vibrationless mounting, larger area for heat radiation, and increased quietness of operation. Send for copy to WINFIELD H. SMITH CORP., Dept. 84, Springville, N. Y., or circle **Inform-A-Gram Key No. B9.**

**A DUAL-PURPOSE METAL TURNING LATHE,** known as DuoLathe, is presented by its manufacturer, Small Machines, Inc., in a new folder. The DuoLathe is particularly suited for jewelers, machine shops, laboratories and tool rooms, as well as all instrument work. Its extreme accuracy and ease of operation, together with many other features, is described in detail. Send to SMALL MACHINES, INC., Dept. 77, 2010 S. Sepulveda Blvd., West Los Angeles 25, Calif., or circle **Inform-A-Gram Key No. B10.**

**MULTI-PURPOSE CRANK SHAPERS** are the subject of a new 24-page catalog just off the press of General Engineering & Manufacturing Company. The catalog includes a table of complete specifications on each Gemco Shaper —the plain, production and universal models. There are illustrations and descriptions of each engineering feature, such as: tool head, ram, crossrail, column, base, transmission, bull gear assembly, rocket arm, "Lubrigard" and lubrication system, unilateral table control, rapid traverse, feed mechanism, stroke adjustment, centralized controls, and accessories. This colorful, informative catalog is available at no cost by writing to GENERAL ENGINEERING & MANUFACTURING CO., Dept. TD, 4417 Oleatha, St. Louis 16, Mo., or circle our postage-free **Inform-A-Gram Key No. B17.**


**Using their own set-ups . . . incorporating Walker-Turner Light Machine Tools . . . the Globe plant in Des Moines *gets results.* For example—**

**Four compound-angle legs on milker castings are drilled and milled (formerly an 8 step job), in *two operations.* Output — 400% greater.**

**Another set-up, handling circular motor bases, drills *64 holes in 1½ minutes* on a single drill press. Output—4 times faster.**

**For similar advantages in your plant, investigate the Walker-Turner line.** ***For complete catalog, write to Walker-Turner Division, Kearney & Trecker Corporation, Plainfield, N. J.***

**Four standard 15" Drill Heads in pneumatic feed special set-up: simultaneously drill — then mill — at compound-angles. 15" Drill Head, Model 9-D-13X. 4¼" spindle travel, speeds 600 to 5000 r.p.m. with 1740 r.p.m. motor. Price: less motor and column $48.75.**

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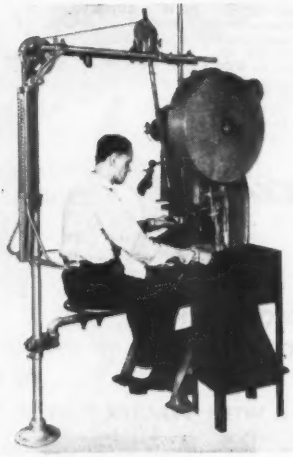
SEE ADVERTISERS INDEX, PAGE 71, FOR KEY NUMBERS

## PUBLICATION PREVIEWS

**THE DI-ACRO SYSTEM OF DIE-LESS DUPLICATING** is fully explained in a new 40-page catalog just off the press of O'Neil Irwin Manufacturing Company. The different models of Di-Acro benders are all pictured and described as to use and specifications. Also pictured are the many different-shaped pieces formed with Di-Acro benders, and the different conversions available for the benders. Di-Acro shears are also described, photographed, and their applications and specifications presented. Di-Acro brakes and radius brakes are thoroughly discussed. Another feature offered by O'Neil-Irwin is the Di-Acro Engineering service which is available without charge. This is also explained in full in this comprehensive catalog. Send for your free copy to O'NEIL-IRWIN MFG. CO., 315 8th Ave., Lake City, Minn., or circle **Inform-A-Gram Key No. B99.**

*You can make your punch presses*
***positively safe***
*with* **POSSONS**
**POSITIVE SAFETY DEVICES**

**The new Red Arrow Pull-Out Multiplier makes "Possons Positive Safety Device" the most efficient, dependable and practical means yet found to make punch press operation safe!**



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*The* **POSITIVE SAFETY MFG. CO.**
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**Engineering Service Upon Request**

**EXPANDED STEEL SERVICE FACILITIES** at Cleveland is the subject of a new 12-page booklet just off the press of Joseph T. Ryerson & Son., Inc., steel distributors. The bulletin begins with a short background of the company's operations in the Cleveland area, and continues with a picture story of their enlarged plant with its new cutting, handling and shipping facilities and added warehouse space. Hot rolled bars, shapes, plates, and sheets are on hand at all times for prompt delivery. Booklet available from JOSEPH T. RYERSON & SON, INC., Dept. 451, Box 8000-A, Chicago 80, Ill., or circle **Inform-A-Gram Key No. B5.**

**TITAN NICKEL SILVER AND NICKEL BRASS** rods, extruded shapes, forgings, and die castings are presented in a new folder by Titan Metal Manufacturing Company. Analyses, physical properties, and interesting information on corrosion and erosion tests are included in the bulletin. Photographs of the various testing operations are shown. Send for copy to TITAN METAL MFG. CO., Dept. 15, Bellefonte, Pa., or circle **Inform-A-Gram Key No. B6.**



PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION

**THE NEW SHAPEMASTER ENGRAVER** is described and illustrated in a colorful new bulletin, No. 2502, just off the press of The Monarch Machine Tool Company, Sidney, Ohio. This lathe was designed to reduce the expensive and time-consuming art of hand engraving to the speed and repetitive accuracy of machine tool operation. It will turn intricate shapes and designs on glass and plastics, and can form an inside sharp corner. The bulletin includes photographs of the various work turned out by the machine, interesting data on how the machine operates, what it will do, and construction details. Complete specifications are also included. Send for your copy to THE MONARCH MACHINE TOOL CO., Dept. 538, Sidney, Ohio, or circle **Inform-A-Gram Key No. B1.**

**UNIVERSAL COLLET CHUCKS,** for practically every machining operation on all types of metalworking equipment, are offered in a new catalog published by Universal Engineering Sales Company. Universal's complete line is shown in this catalog, No. CC-1013, together with prices and specifications. In addition to the basic collet chucks, there are coolant-fed chucks for deep hole drilling; floating chucks for reaming, tapping and counterboring; adjustable collet chucks for correction of misalignment and angularity; and the boring chuck for precision boring operations. All of these are interchangeable. This attractive, informative catalog is available by writing UNIVERSAL ENGINEERING SALES CO., Dept. 276, Frankenmuth, Mich., or circle **Inform-A-Gram Key No. B23.**

**14" SOUTH BEND PRECISION DRILL PRESSES** are the subject of a new catalog, No. 400, recently released by South Bend Lathe Works. Both the bench and floor models of these new presses are illustrated and described—as are motors, controls, extra spindles and other drill press accessories.

These 14" presses are a completely new design and have several original features which add to their convenience and ease of operation. Two of these features are a built-in shadowless light and a quick-acting belt tension release lever. Diagrams, specifications and prices complete this catalog. Send for copy to SOUTH BEND LATHE WORKS, 391 E. Madison St., South Bend 22, Ind., or circle **Inform-A-Gram Key No. B98.**

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SEE ADVERTISERS INDEX, PAGE 71, FOR KEY NUMBERS

## PUBLICATION PREVIEWS

**A NEW SMALL TOOL CATALOG** is just off the press of George Scherr Company which presents Scherr's complete line of micrometers, vernier calipers, height gages and other machinist's tools for toolmakers and mechanics. The 28-page catalog illustrates each tool with close-up photographs, accompanied by detailed descriptions. In addition to the standard line, the book introduces a number of newly developed specialties which will be of interest to all precision workers. Among the products shown are the Scherr Magni-Rays, a new thickness measure, the Optical Center Locator, and Quartz Optical Flats. Announcement is made in the catalog of a new book department, in which George Scherr has useful books for the machine shop available. Send for copy to GEORGE SCHERR CO., INC., Dept. 490, 200 Lafayette St., New York 12, N. Y., or circle **Inform-A-Gram Key No. B19.**

**A NEW BROACH SHARPENER BULLETIN** has been issued by Colonial Broach Company, Detroit. The 12-page technical bulletin (No. S-48) describes Colonial's complete line of machines for sharpening flat and round broaches. One page is devoted to each machine—giving specifications, special features, and "labeled" illustrations pointing out the various features. Sharpeners include two flat broach sharpeners which handle broaches up to 32" and 65" long; three "round" broach sharpeners for broaches up to 36", 72", and 84" long; and two "universal" models, which handle both round and flat broaches. A complete list of standard and special equipment is included, plus a unique pictorial index for simple locating of the correct machine. Send for your copy to COLONIAL BROACH CO., Dept. 26, Box 37, Harper Station, Detroit 13, Mich., or circle **Inform-A-Gram Key No. B14.**

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STANDARD CARBIDE TOOL LINE—
STANDARD Carbide REAMERS
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Whatever the job, Super is prepared to serve your need. All the above reamers, for instance, are carried right in stock in a wide range of sizes.
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**KNIGHT PRESS BRAKES** are portrayed in a new bulletin published by Knight Machinery Company. This lower priced press brake incorporates many of the features of larger, more expensive machines. Series "A" and "B" are fully described and illustrated. Construction details are given in detail as well as specifications. Knight press brakes are designed for ease of service, lubrication and repairs. Wear plates and guides can be replaced without any machine work except drilling dowel holes. Send for the bulletin to KNIGHT MACHINERY CO., Dept. 351, 1000 S. Delaware, Indianapolis 2, Ind., or circle **Inform-A-Gram Key No. B20.**

**CHATTERLESS COUNTERSINKS,** ranging in sizes from $\frac{3}{16}$" diameter to 2" diameter, are presented in a new bulletin, No. 16-C, by Severance Tool Industries, Inc., Saginaw, Mich. The countersinks are in both standard and heavy duty type groups. Send to SEVERANCE TOOL INDUSTRIES, INC., Dept. 461, Saginaw, Mich., or circle **Inform-A-Gram Key No. B12.**



PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION

**THE HILL PNEUMATIC RIVETING MACHINE,** for high speed production riveting, is presented in a new folder just off the press of Hill Machine Company. The folder illustrates the machine and points out the various features incorporated into it to make it accurate, versatile, and easily operated. The folder has detailed descriptions of the rotating hammer—which is operated by a small air motor, the stationary or elevating anvil and its operation, the two types of work tables which are available, the automatic timer, the types of controls, and special equipment. The last page is devoted to complete specifications and a price list. Send for the folder to HILL MACHINE CO., Dept. 36, 1032 Mulberry St., Rockford, Ill., or circle **Inform-A-Gram Key No. B21.**

**DIAMOND PUNCH PRESSES** are among the different Diamond Machine Tool Company's products illustrated and described in a new folder recently published. Prices, specifications and descriptions of the 9 ton, 14 ton, 31 ton and 56 ton presses accompany photographs of each. Also presented are Multi-Max (multi-purpose and maximum production) presses, power squaring shears and the M-30 milling machine. Send for your copy of this pocket-size folder to DIAMOND MACHINE TOOL CO., Dept. 268, 3429 E. Olympic Blvd., Los Angeles, Calif., or circle **Inform-A-Gram Key No. B97.**

**WALES NOTCHING UNITS,** for notching mild steel up to ⅛" thick, are illustrated and described in Catalog N, recently released by Wales-Strippit Corp. These Wales Notching Units are independent and self-contained, with nothing attached to the press ram. Therefore, rapid setups in stamping presses and brakes are possible. Colored illustrations, cross-sectional drawings and specifications are included. Send to WALES-STRIPPIT CORP., Dept.60, 345 Payne Ave., N. Tonawanda, N. Y., or circle **Inform-A-Gram Key No. B4.**

**CARBON AND STAINLESS STEEL TUBING** is the subject of a new 32-page bulletin published by Joseph T. Ryerson & Son, Inc. Beginning with the history and manufacture of tubing, the bulletin points out the many applications for mechanical tubing; gives information on machining, heat treating and fabrication; tells how to specify size and quantity; discusses the use of tubing instead of bars for machined parts; and gives reference data such as tubing tolerances, mechanical properties, tempers, and decimal equivalents, analyses and definitions. Profusely illustrated, the bulletin is available from JOSEPH T. RYERSON & SON, INC., Dept. 451, P. O. Box 8000-A, Chicago 80, Ill., or circle **Inform-A-Gram Key No. B15.**

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The Wells No. 12 marks a revolutionary step in metal cutting. Place the stock in position, push the starting button and the head comes down automatically. The cut is made at a controlled blade pressure to any desired depth and the head returns to a raised position after completing each cut. Ask your Wells dealer for full details or write the factory.

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WELLS MANUFACTURING CORPORATION

1940 CEDAR ST., THREE RIVERS, MICHIGAN



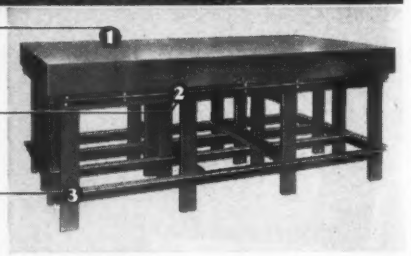

SEE ADVERTISERS INDEX, PAGE 71, FOR KEY NUMBERS

## PUBLICATION PREVIEWS

**THE REISHAUER GEAR GRINDING MACHINE,** Type ZA, is dramatically portrayed in a new catalog issued by the exclusive agents for Reishauer of Zurich, Switzerland—Cosa Corporation. The machine operates on the generating principle and can grind high precision gears with extremely high production. A single thread grinding worm with rack profile is employed which is not limited to a certain restricted number of cutting faces, but generates the theoretical shape of the tooth by means of an infinite number of enveloping cuts. The profusely illustrated catalog describes the machine in detail, as well as its capabilities, specifications, equipment and working operation. Write to COSA CORP., Dept. 250, 405 Lexington Ave., New York 17, N. Y., or circle **Inform-A-Gram Key No. B18.**

**ATLAS BELT AND DISC SANDER** for wood, metals, and plastics, is offered in a new brochure just off the press of Atlas Press Company. This model, No. 5010, has a 10 inch diameter disc, 4 inch belt, precision ball bearings, and a table with a 45° tilt in both directions. The machine will sand any width boards, angles, curves on metals, or plastics. The brochure includes photographs of the machine itself and its parts, specifications, and complete descriptions of its construction and working ability. In addition to Model No. 5010, Atlas drill presses, jig saws, shapers, lathes, and other machines are briefly discussed and illustrated. Send for your copy to ATLAS PRESS CO., Dept. 537, 2312 N. Pitcher St., Kalamazoo, Mich., or circle **Inform-A-Gram Key No. B22.**


FOR REPEATED ASSEMBLIES AND ACCURATE LAYOUTS




True, smooth surface of special analysis semi-steel.

Lock-leveling screws allow quick leveling.

Sturdy, multi-legged arc-welded stand.

CHALLENGE
LAYOUT SURFACE PLATES

- Built to "stand the gaff" of hard service. True, smooth surfaces of special analysis semi-steel with heavy, deep ribs to prevent sagging and yielding under load.
- Standard plates 6" thick, 8" plates on order. Sizes 12"x18" to 54"x144". Large units can be made up by grooving and keying several standard units.
- Sold with or without sturdy, multi-legged arc-welded steel stand with lock-leveling screws to allow quick leveling.

Write for Challenge Precision Equipment Catalog.

570

THE CHALLENGE MACHINERY CO.
GRAND HAVEN Challenge MICHIGAN


**TRI-PHASE RESISTANCE WELDERS,** for spot, projection, seam and upset butt welding, are presented in a new illustrated bulletin, No. 10-813, by The Taylor-Winfield Corp., Warren, Ohio. Many outstanding features of these welders are explained, such as the three-phase balanced power load, the high power factor, and the reduction in power demand accomplished. Copies available from THE TAYLOR-WINFIELD CORP., Dept. 75, Warren, Ohio, or circle **Inform-A-Gram Key No. B7.**

**"ALEMITE CONTROLLED LUBRICATION FOR INDUSTRY"** is the title of a new bulletin recently published by Alemite, a division of Stewart-Warner Corp. Four basic systems of centralized lubrication that are now available to industry through Alemite distributors and jobbers are presented. These four systems are compared and illustrated. They are the Lubrometer, Midget Lubrometer, Dual Progressive and Dual Manifold. Tabular data for easy selection of the proper system is included. Send for copy to ALEMITE DIV., STEWART-WARNER CORP., Dept. 581, 1826 Diversey Pkwy., Chicago 14, Ill., or circle **Inform-A-Gram Key No. B8.**

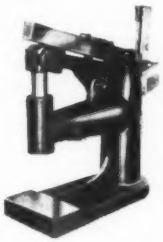


PLEASE USE INFORM-A-GRAM FOR PRODUCT INFORMATION

# Two Modern Assembly Machines

Locating of rivet holes in accessible positions for riveting, deciding upon proper size of rivets, of correct lengths, and providing correct lengths of stock, are some of the important factors to be worked out in advance of a riveting production schedule. The High Speed Hammer Company has established a service whereby they will work out these and many other riveting problems at no charge. Shown in the photograph at right is Model No. 2 AHD of their extensive line of high speed hammers for cold riveting. This model has a rivet diameter of ⅛" to ⅝". Other models range in capacities from No. 1AA, which has $\frac{1}{64}$" to $\frac{1}{16}$", up to No. 7B, which has capacities of ¾" to 2".

Another versatile assembly machine produced by The High Speed Hammer Company is the automatic staking machine, pictured below. This machine has a uniform blow—assuring uniformity and interchangeability of finished work. The dual action holds the work firmly by pressure pad while it is being struck by the hammer. The weight of the hammer blow can be adjusted for proper foot pound blow, and the hammer is impossible to trip while fingers are in the die—an important safety feature.

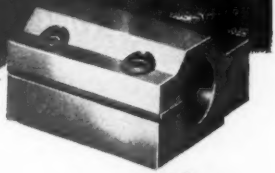


Although expressly designed for staking or riveting fixed or movable joints, the machine is equally adapted for such operations as eyeletting, inserting grommets, burring, and pointing with platinum, tungsten or silver.

Illustrated brochures, complete with full descriptions of these two machines, are available by writing The High Speed Hammer Co., Inc., Dept. 32, 313 Norton St., Rochester 5, N. Y., or circle **Inform-A-Gram Key No. D49.**


*Now* YOU CAN ADAPT *All* BOKUM BORING TOOLS TO TURRET LATHES

The same notable economies that users of Bokum Long-life, Precision Boring Tools have been enjoying for over a decade on lathes and boring mills are now extended to operators of turret lathes —through our development of Turret Lathe Tool Holders, shanks and adapters.



(A)

Holder BT-24 (top) has 1½" bore. Accommodates split bushings (A) to hold ¾" and 1" shanks for Bokum Tools Nos. 4 to 12 to give you boring range 1⅛" to 2" min. dia.
You have but one investment in shanks; only cutters need be replaced.

Adaptor B-100-70 (below) fits holder. Has ⅜" bore to hold Bokum Tools Nos. 00000 to 3, giving you theoretical boring range ⅛" to ⅝" min. dia.

Ask for folder E-1048 giving complete information.

This combination increases efficiencies in boring operations. It brings you advantage of using entire range of Bokum Tools on turret lathes.

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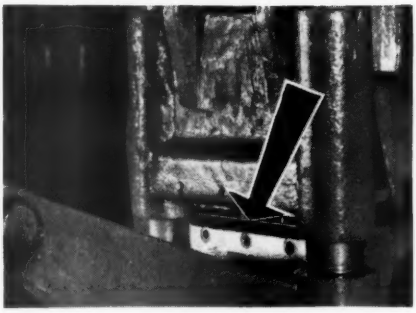
TRADE MARKS REG. U. S. PAT. OFF.
14775 WILDEMERE AVE. · DETROIT 21, MICH.
SINGLE POINT BORING TOOLS—INTERNAL THREADING, ROTOSWING AND FACING TOOLS—CARBIDE TIPPED TOOLS

# Carbide Cut-Off Blades

Carbide blades, designed as inserts for old shear blades utilized on high speed roll feed presses, are now available from the Gem Tool Company, Butler, Wisconsin. A special grade of carbide, recently developed, has been found to be best suited for this type of work. In actual use, over ten million cuts per grind have been experienced, as against three to four hundred thousand cuts with HSS or HSHC steel blades when cutting silicon steel for laminations. This is a ratio of better than 25 to 1. This special carbide, combined with the high finish blade grinding by the Gem Tool Company, is responsible for the long service rendered by these blades. They can be inserted in any length and in special cases can be limited to the exact locations of the cut; that is, it is not necessary to insert the carbide the whole length of the shear blade. Thus, replacement of new cut-off blades can be reduced to a minimum.



A regrinding service has been established by the Gem Tool Company which will materially reduce the cost of this work to the user. Because the carbide blade will last indefinitely, the user can forget his cut-off blade worries.

Complete information can be obtained by writing the Gem Tool Co., Dept. 82, 4711 North 125 St., Butler, Wis., or circle **Inform-A-Gram Key No. D47.**

It's easy! The Perfex Radius Dresser is as simple to set as a "mike." Hardened and ground micrometer screw permits precision setting throughout the full range — from 2" convex to 2" concave. Take reading *directly* from micrometer head — *eliminate* height gauges, "mikes" and errors — gain simplicity, accuracy, hours of time. Simple as A B C; set your diamond to Master Setting Block furnished — then operate same as micrometer.

The Perfex Radius Dresser will dress concave radii smaller than .050" — *full 180°*. Dressing head is graduated each 5°, equipped with stop dogs to permit dressing within given arc. One revolution of mike screw moves diamond .025", providing rapid adjustment. It's a *precision* instrument, manufactured by gage makers mindful of tool-makers' requirements. Durable carrying case with Master Setting Gage and provision for our standard diamond tool and attachment for small concave radii.

**$149.00** complete with hardwood case and attachments.

**Perfex** GAGE AND TOOL CO.
133 AVERY STREET • MT. CLEMENS, MICH.

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# Aldus C. Higgins Dies

Aldus C. Higgins

Aldus C. Higgins, for nearly a half century closely identified with Norton Company, the largest industry in Worcester, Mass., and long active in the city's cultural, philanthropic and educational life, died September 10 at his home in Worcester. At the time of his death, Mr. Higgins was chairman of the Norton Company executive committee. Mr. Higgins' first connection with Norton Company was in 1900 as patent counsel from which he progressed to counsel and resident manager of the abrasive plant in 1901. In 1903 he was advanced to general counsel and general manager of the abrasive plants. He was named secretary and general counsel in 1913, and in 1933 became both president and general manager. He was elected chairman of the board of directors in 1941.

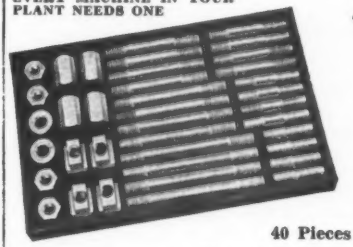
Always interested in the technical side of the manufacturing business, Mr. Higgins invented the water-cooled electric furnace which made possible the commercial production of Alundum abrasive and was awarded the John Scott Medal in 1913 by Franklin Institute for this outstanding invention.

On his 75th birthday anniversary last December, Mr. Higgins was honored by the King of Sweden during the annual Norton Company service awards party in the Worcester Memorial Auditorium. He was decorated by the King, through the Swedish Consul-General, with the Royal Swedish Order of Vasa, first class, with the rank of Chevalier. The decoration was bestowed in recognition of his outstanding contributions to industry and art. Mr. Higgins had previously been honored by the governments of both Sweden and Finland.


Get Set for Quick Set-Up!

Handy **STUD AND NUT SET**

EVERY MACHINE IN YOUR PLANT NEEDS ONE



*Saves You*

Machine Hours

Man Hours

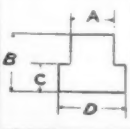
*

*Cuts Costs and Pays for Itself*

40 Pieces in Each Set

All Sets in Individual Cases

Specially designed T-slot nut will prevent damage to table slots caused by ordinary nuts.




| Holes & Thread | A | B | C | D |
|---|---|---|---|---|
| ½"—13 THD. | .555 | ¾" | 11/32" | ⅝" |
| ⅝"—11 THD. | .675 | 1⅛" | 15/32" | 1⅛" |
| ¾"—10 THD. | .800 | 1⅜" | ⅞" | 1⅜" |

Made of Quality Steel. Case Hardened and Chrome-Plated for Long Life. Class 3 Threads. Sets Sized to Provide Greater Rigidity in Clamping.

Prices

½" Set, $24.00

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Order Today! Immediate Delivery!

NOBLE & STANTON, INC.

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| Seating hole diameter up to | A | B | C | D |
|---|---|---|---|---|
| 2in. | — | — | — | — |
| 3in. | 3.003 | 3.50 | 0.50 | 2in. |
| 4in. | 4.004 | 4.75 | 0.501 | 2½in. |
| 5in. | 5.004 | 5.75 | 0.501 | 3in. |
| 6in. | 6.005 | 7.00 | 0.501 | 3in. |
| 7in. | 7.005 | 8.00 | 0.502 | 3½in. |
| 8in. | 8.006 | 9.50 | 0.622 | 3½in. |

TABLE III

1Retaining screws at flange joint.
2Retaining screws passing through flange.

# Die Casting Die Design

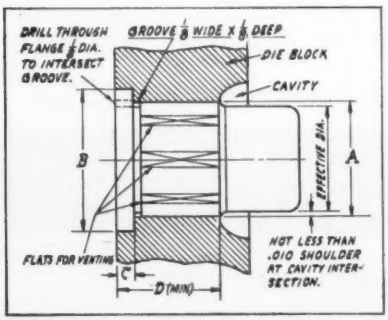
(CONTINUED FROM PAGE 66)

time in order to machine them in place; and (2), because long projecting cores are subject to erosion and breakage, the use of inserted cores eliminates expense in building the die and difficulty in replacing broken cores.

A further advantage of the use of inserted cores is that, when they are complex and of intricate shape (Figure 3), they are more easily machined when they can be made as individual units rather then when they are integral parts of large cavity blocks.

Fixed cores, which must remain rigid in use yet be readily removable in case of damage or breakage, are made a press fit in the die block and are shouldered at the back end for accurate positioning (Figure 3). The usual method of calculating the core sizes is shown in Tables II and III.

*Fig. 4. Standard fixed core installation. The fixed core goes through the cavity block and is shouldered at the back. Table III gives the standard dimensions. Note the flats for air venting.*



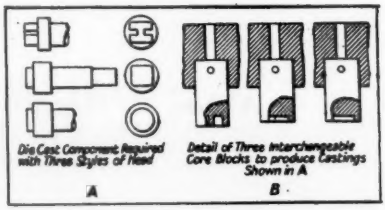


Die Cast Components Required with Three Styles of Head
Detail of Three Interchangeable Core Blocks to produce Castings Shown in A
A
B

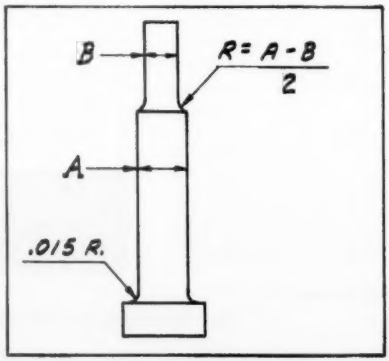
*Fig. 3. The use of interchangeable core block eliminates the necessity for dismantling the die.*
*Courtesy of Machinery (London).*

As indicated in Figure 4, slight flats are ground on the sides of the core in three or more places to assist in evacuating air from the die cavity. This is particularly necessary when cores are located at the bottom of recesses in the main cavity. That portion of the core projecting into the cavity is given a slight taper to promote ease of ejection and to minimize distortion. It is always advisable to increase the diameter by at least .32 inch at the cavity intersection in order that displacement of the core may at once be seen and remedied.

The shoulder at the back of the fixed cores (Figure 5) prevents the cores from being pulled through the block when a casting gets "hung" onto their front projecting face. Fixed cores are thus easily removed and replaced when the need for changing them arises.

(TO BE CONTINUED)

*Fig. 5. A typical small, circular, fixed core. Note the shoulder having a radius equal to one-half of the shank diameter, A, minus the diameter, B, of the projecting portion of the core. The shank shoulder at the core's base also has a fillet, equal in this case to .015" radius. This fillet prevents cracking of the core at the point where the fillet is added.*
*Courtesy of Johnson Motors.*



# Carbide Cut-Off Blades for Roll Feed Presses

The Gem Tool Company has developed a carbide blade that can be inserted to your order on any high speed roll feed press. A special grade carbide is used that gives the user better than a 25 to 1 ratio over high speed steel.

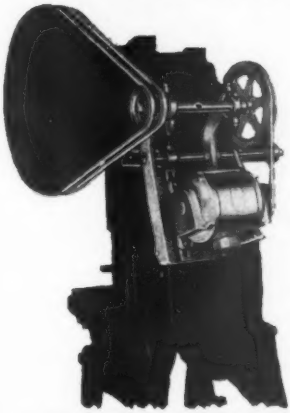
It is not necessary to purchase new shear blade, since Gem can install this special carbide insert in your present blade. Also, a regrinding service is available that will reduce considerably the original cost of this superior blade.

One user reports 10,000,000 cuts per grind as against only 300,000 to 400,000 when HSS or HCHC steel was used. This was on a silicon steel for laminations.

*Please write for complete information*

**GEM TOOL COMPANY** 4711 NORTH 125th STREET BUTLER • WISCONSIN

# MODERN MOTOR DRIVE



## Puts the "PUNCH" in Punch Presses

"V" Belt Drives deliver the full horsepower from the motor to the flywheel—smoothly—silently—efficiently—economically.

Utilize standard 1750 RPM motors. Immediate deliveries

*We invite your communications*

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**MODERN MOTOR DRIVES DIVISION** of
The Nichols Engineering Co. 2400 W. Madison St., Chicago 12, Ill.




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# NIAGARA Aero Cooling Pays for Itself!

**Saves Cooling Water, Increases Capacity, Saves Operating Costs**

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## NIAGARA Aero HEAT EXCHANGER

Cools fluids to within 10° of atmospheric wet bulb temperature; holds to tolerances of 2°F.

Heat treaters increase production, improve quality, decrease rejections by controlling quenching bath temperatures with NIAGARA Aero Heat Exchanger.

Also used in liquid cooling in industrial and chemical processes, water jacket cooling, hydraulic fluid, transformer oil, lubricating and cutting oil cooling, vapor and steam condensing.

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# SELF-LOCKING SOCKET SET SCREW

The KNURLED cup point of this popular "Unbrako" Socket Set Screw makes it a *Self-Locker* . . . because the keen edges of the counter-clockwise KNURLS won't creep, *regardless* of the most chattering vibration. A real fastener, if ever there was one . . . positively *won't shake loose.*

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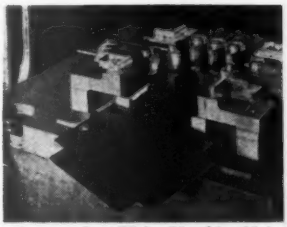
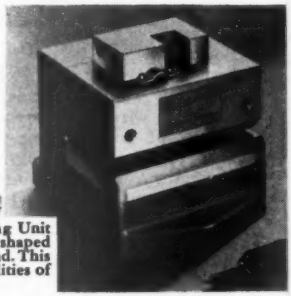
*Specialists in Hole Punching and Notching Equipment*

**TYPICAL STANDAR AND SPECIAL NOTCHING UNIT**

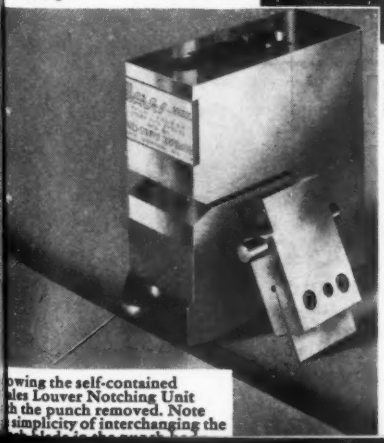


Showing four Wales Notching Units bined with Wales Type "BL" Hole P ing Units in a press setup.

group of Wales Louver Notching nits in operation in a press brake. ote the long narrow notches in the uver strip.



Showing a special Wales Notching Unit which notches the unusual irregular shaped corner notch shown in the foreground. This partially illustrates the wide possibilities of special Wales Notching Units.



owing the self-contained les Louver Notching Unit h the punch removed. Note simplicity of interchanging the

● There is always something new in the Wales Line. This time it's a new type N ing Unit made specially for Fluorescent Light Fixture Manufacturers. Reports manufacturers using these Units prove that the *Best Way* is the *Wales Way.*

Wales Notching Units are self-contained with punch and die in perfect alig which reduces punch breakage to a minimum. The patented design of Wales l ment permits the same group of units to be used in unlimited setups at various c for varying lengths and widths of fluorescent louvers. Practically no press "down ...one stand-by unit may be substituted in the operating setup for a unit with dull p

Send prints or samples of the work and press specifications for Wales Eng recommendations.

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*George F. Wales, President*

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*(Between Buffalo and Niagara Falls)*

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# The Powder Weld System

A challenge to producers of powdered materials and promise of revolutionary welding and surfacing processes are seen in the flame tool, Powder Weld. The equipment is a new method of welding, brazing or surfacing with infinite compositions of powdered materials.

Powder Weld can be used as a temperature controlled torch which produces a superior weld or braze without the use of rod, wire or separate flux. Compositions of powdered or finely divided metals, together with suitable fluxes, are projected through the flame cone onto the work surfaces. Fuel gas, oxygen and a processing gas are used together to provide temperature control not available in any other torch.

Because no separate rod or flux is required, this is a one-hand operation. Independent controls available to the operator enable him to achieve the following results: precise control of flux used with metal or alloy; amount of the mixture used per minute or per inch of weld or braze; flame temperature and atmosphere; cooling or processing gas independently of fuel and projecting gas, temperature of metal, alloy, or material projected; and temperature or work surface. Typical applications are hard facing, surfacing with plastics, synthetics, enamels or glazed coatings, brazing with powdered alloys, welding with powdered metals, rod welding with projected flux, controlled atmosphere welding, conventional torch and rod welding.

Prevalent use of Powder Weld at the present time is for high quality hard surfacing of everything from small tools to steel rolls, primarily because there are more alloys available in suitable form for hard surfacing than for welding or brazing. The quality of results obtainable and the variety of materials which can be used are due to the combination of controls employed in the system. Certain available alloys, which are so hard that no practical method had been discovered for their surface application, can be applied by Powder Weld.

A bulletin illustrates and describes equipment and is available on request from Powder Weld Co., Dept. 9, 419 Kent Ave., Brooklyn, N. Y., or use **Inform-A-Gram Key No. D13.**


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Regardless the shearing job, straight or irregular, you can do it faster—better with a BEVERLY Throatless Bench Type Shear. Comes in 4 sizes . . .

No. B1—cuts 14 gage—weight 13 lbs.
No. B2—cuts 10 gage—weight 35 lbs.
New Junior—cuts 18 gage, weighs 6 lbs. Stands available for all sizes of Beverly's Shears.
No. B3—(Equipped with ball-bearing holddown device)—cuts 3/16 inch mild steel or 10 gage stainless, wt. 58 lbs.

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**TOOL CORPORATION**
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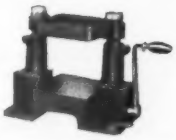

Four NEW small
"C" type Drill Jigs

Two spring type
Two rack and pinion type

*Write for sizes and detailed information*

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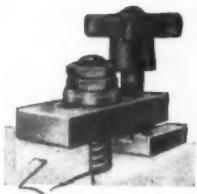
*Fixture Clamps and Fittings*



These clamp assemblies are made in 14 STYLES in 73 SIZES. There is a clamp to meet the requirements of practically any need.

Fixture details are available in 15 STYLES in 156 SIZES.

*Immediate Delivery*

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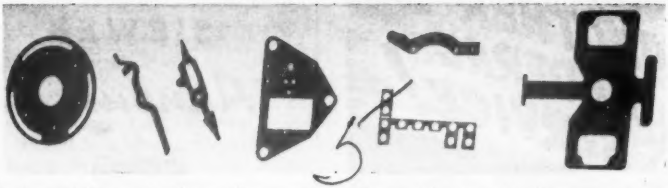
## STAMPINGS--SHORT RUNS



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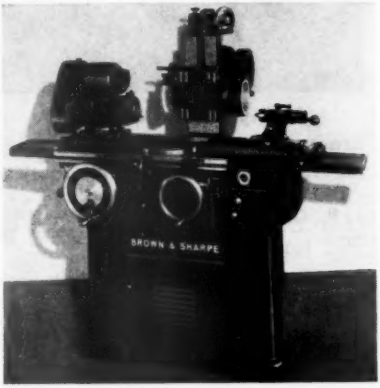
## Redesigned Grinding Machine

Brown & Sharpe have redesigned their general purpose grinding machine No. 13 for easier operation and maintenance. The machine, driven by three constant speed motors, is particularly useful for toolroom operations such as grinding small and medium-sized cylindrical work, form grinding, and sharpening. Three suitable wheel spindle speeds are provided and full 5000 surface feet is available for a 7" wheel. Six rates of table speeds, from 7¾" to 100" a minute, can easily be selected from the front of the machine. Two rates of hand table travel are provided, and play can be obtained between rim of handwheel and hub to facilitate "bumping" when moving table only slightly.

Headstock provides four work speeds, 106 to 525 rpm, for both dead-center and revolving spindle drive. Built-in electrical controls, and automatic lubrication of table ways and all mechanisms, are two more features of this machine. A wide variety of attachments and additional equipment is available to further broaden the scope of the machine. For further details, write Brown & Sharpe Mfg. Co., Dept. 673, 235 Promenade St., Providence 1, Rhode Island, or circle **Inform-A-Gram Key No. D41.**





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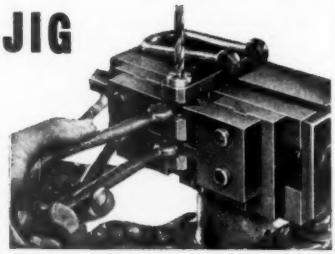
FOR DRILL PRESS OR TAPER

*To hold parts of any description*

**HEUSER MFG. CO.**
1638 N. PAULINA ST., CHICAGO 22, ILL.



"The STANDARD of COMPARISON for QUALITY and ACCURACY"

• QUALITY
• SERVICE

IMMEDIATE DELIVERY!

AMERICAN DRILL JIG BUSHINGS

Precision made from finest oil hardened tool steel — ASA Standard — featuring concentric ground lead to insure perfect alignment. Complete stocks maintained at all times by exclusive distributors throughout the U. S. and Canada, for immediate free delivery.

SEND FOR FREE CATALOG A

American Drill Bushing CO., INC. 1110 So. Santa Fe Avenue, Los Angeles 21, Calif.

*All-steel, welded construction . . . heavy-duty ball-bearing wheels . . . gears fully enclosed . . . handy crank-operated hoist does heavy lifting.*

One man . . .

handles dies up to 3,000 lbs.!

The BARRETT MULTI-DUTY DIE TABLE makes it possible for one man to do everything! It's a lifting table, workbench, die separator and floor truck all in one. Barrett has designed it to save time and energy; cut costs in storing, moving and setting up dies.

This versatile die table is offered in two sizes with 44″ x 28″ and 36″ x 24″ tables; safe load capacities from 2,000 to 3,000 pounds. Write today for descriptive bulletins.

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4633 S. Western Blvd., • Chicago 9, Ill.
*Representatives in all Principal Cities*
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Barrett Handling Equipment

BARRETT

ONE MAN DOES MORE THAN 3 OR 4 . . . WITH A BARRETT



SEE ADVERTISERS INDEX, PAGE 71, FOR KEY NUMBERS

# *Our 10th Anniversary Celebration*

This is a story which follows a pattern that is old, yet ever new and exciting. It is the story of the growth and development of a small business such as can happen only in America.

On November 15, 1938, J. R. Fitzsimmons and his two sons, Warren H. and Joseph T., formed a partnership and started a new business — The Die Supply Company. With J. R.'s long experience in the selling of die sets and die supplies to all of industry, the help of his two sons, and their combined enthusiasm, they felt confident that they would make the grade.

An office and stockroom space were rented at 2059 Hamilton Avenue, Cleveland, Ohio where the 2,000 square feet of space allowed plenty of room for their original stock of die sets, socket screws, a few die makers' accessories, and Cerro alloys. J. R. took charge of sales and management, while Warren H. headed the engineering and mechanical department, and Joseph T. was office manager, accountant and buyer. This was The Die Supply Company — complete — ten years ago.

But not for long. Less than a year later business had increased to the extent that twice as much space was necessary and 1390 East 30th Street did the trick. Here were installed die set assembly equipment, a hydraulic press, a boring mill and a lapping machine. Also added at this time were three men and two office girls to handle the increasing business. "We Deliver the Goods", intended to signify that ample and diversified stocks were on hand at all times became the company slogan. Notwithstanding the critical shortages during this period, Die Supply invariably worked out ways and means to satisfy customers' requirements.

Two years later the company, still growing, moved to even larger quarters at 4747 Hough Avenue, where 19 men and women were now employed. It was at this time that I, R. E. Shaw, joined the company as office manager.

In December of 1945 the rapidly expanding organization moved to its present address, 5349 St. Clair Avenue, where it now occupies 21,000 square feet — a ten-fold increase in ten years. At this time, Mr. Fitzsimmons, having long recognized the need in the Cleveland area for special die sets that could be produced promptly, undertook the manufacture of large and special die sets. Adequate machinery was installed for this purpose, including a 72" x 72" by 18' planer, a 48" grinder, a 36" grinder, a 6' heavy duty radial drill, a boring mill and a heavy duty horizontal mill. With this equipment and several smaller machines, the firm has successfully turned out die sets as long as 12 feet, weighing up to 18,600 pounds. The successful manufacture of large die sets is credited to Homer Lindahl, who, as shop superintendent, is in charge of this department.

Today, after ten years of earnest efforts on the part of its founders and our staff, The Die Supply Company is a successful, typically American business — still expanding. An office and warehouse are now operating in Dayton, Ohio, and a sales office is maintained in Pittsburgh. A year ago our company was incorporated. Warren's title is now Vice-president in Charge of Engineering and Manufacturing; Joseph's is Vice-president and Manager of the Dayton Office, and J. R. heads our company now totaling 45 employees, with the same graciousness and enthusiasm and personal touch as he did ten years ago when the company was in its infancy.

*R. E. Shaw*, Secretary & Treasurer

---

THE DIE SUPPLY COMPANY

5349 St. Clair Avenue

Cleveland 14, Ohio

*You're always right*

# WITH STAR

From the start you'll notice how much faster Star Blades cut metals . . . and with a truer cut, that leaves a cleaner surface. Tough, durable Star Blades lessen "time-outs" on the job, too. You see, every Star Blade is made of finest high-grade steel . . . precision-set teeth assure fast cutting and full side clearance. You'll appreciate the metal-cutting economies of Star Blades.

Your local jobber or distributor will be glad to help you choose a Star Blade to suit your job, ask him for the NEW Star Wall Chart for your shop . . . the Star Metal Cutting Booklet for pocket or tool kit—they both contain a world of useful information and are absolutely FREE.

**CLEMSON**
**BROS., INC. • Middletown, N. Y.**
Makers of hand and power hack saw blades, frames, metal cutting band saw blades and the Clemson Lawn Machine.

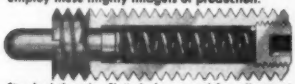
5208

# SMALL *BUT* MIGHTY

## SPRING PLUNGERS

*Completely Unitized*
**ARE SERVING INDUSTRY IN A *BIG* WAY**

Industrial leaders, manufacturers of Air-Craft, Automotive, Electrical Appliances, Farm Equipment, Radio, Optical Goods, Office Machines, and many others, use and endorse Vlier products — in fact, in every branch of industry, wherever positive accurate spring-tension plunger action on jigs, fixtures and die work is required, Vlier products are accepted as standard. You, too, can profitably employ these mighty midgets of production.



Standard threads. Slotted plunger end for adjustment, top or bottom. Hardened round nose plunger telescopes within body, permits easy insertion of workpiece. Spring maintains tight, positive end pressure of 5 to 42 lbs. Rust-proofed. Individually boxed.

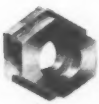
### SPRING STOPS

Used where no wall sections are available. Bolted to fixture base through drilled flanges. Hardened plunger end provides 14 lbs. pressure. Rust-proofed. 6 to a box.

### TORQUE THUMB SCREWS

End pressure automatically limited, provides accurate holding tension. No work distortion, costly rejects, or expensive fixture rework. Individually boxed.
17 sizes offer various types and end pressures.

### MULTI DIMENSIONAL FIXTURE KEY



Counterbored hex nut having stepped sides. Milled to maintain tolerance of ± .0003 between sides, — assuring perfect alignment. Each pair of sides form three individual key widths which fits standard table slots. Two Keys, in any fixture, can be used on three machines having varying slot dimensions.

**WRITE TODAY FOR DETAILED LITERATURE AND LOCATION OF NEAREST VLIER SUPPLY HOUSE**

**VLIER MANUFACTURING CO.**
*Manufacturers of Production and Tool Specialties*
4552 BEVERLY BLVD. LOS ANGELES 4, CALIFORNIA



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# SCHERR *aids to precision – production*

**Save time on Surface Grinders With Scherr MAGNE-BLOX**

When placed on a magnetic chuck, these magnetism-conducting parallels and angle irons will firmly hold small pieces and irregular shaped work. **No need** of special clamps or fixtures. THEY RETURN THEIR COST many times over by quicker setups, more accurate results, less danger of distortion and bowing when grinding thin flat work. Many different sizes and shapes. DON'T REGRIND YOUR MAGNETIC CHUCKS—BE WISE—USE MAGNE-BLOX—**Special Offer:** Set consisting of 2 parallels 1 x 1¾ x 3¾ plus 2 V-blocks, hard brass and Swedish iron laminations in solid metal case, $17.50. Money back if you can duplicate this value.

**Scherr Cutting Tool Grinding Fixture**

FOR SURFACE GRINDER, grinds both cutting angle and clearance in one setting. The unique, patented feature is a tilting block which gives 3, 5, 7, or 10 degrees clearance to the tool, just the right cutting angle to suit the material to be machined. This simple inexpensive tool does the work of special machines. Clamp the tool to be ground in the Scherr Fixture, set to angle desired and tilt the block to proper clearance. Special introductory price, $27.50. F.O.B. New York, with Scherr money back guarantee.

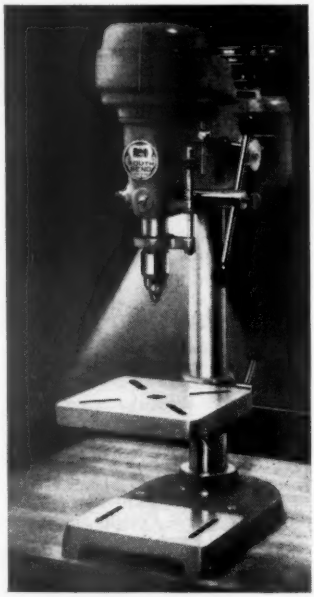
**Little Wonder Radius Dresser**

Dresses wheels on surface or cylindrical grinders to any desired radius up to 1", concave or convex. The swinging arm, the only moving part of this ingenious simple device, is pivoted on two lapped centers which never freeze or clog. Supported on both ends with no overhang or slides, there can be **no vibration of the diamond.** Result: absolutely smooth and accurate radii on the wheel. The diamond tool is set by means of micrometers, depth gage or gage blocks. Price complete with ⅛ carat diamond, $46.00—$39.50 without.

**GEO. SCHERR CO., Inc.**
197-A Lafayette St. New York 12, N.Y.


# Precision Drill Press

A new 14" precision drill press has been announced by the South Bend Lathe Works. The manufacture of a drill press is a departure for this company, which has manufactured precision lathes exclusively for over 40 years. Designed by the same engineering staff and produced with the same excellent manufacturing facilities employed in the



production of the well known line of South Bend Precision Lathes, the drill press is the result of several years of careful research, thorough testing, and improvement. A quick-acting belt tension release lever simplifying the changing of the spindle speeds, a built-in light providing shielded illumination for the work area, and a 10" x 10" full tilt type table are some of the features of this press. Full details are available from the South Bend Lathe Works, Dept. 5-64, 391 East Madison St., South Bend 22, Ind., or circle **Inform-A-Gram Key No. D1.**



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## Why a *Commander* Tapper?

- **Tapping capacity** 0 to ¾" with **one** tapper.
- **Torque control**—may be adjusted to protect any size tap. This assures safe bottom-hole tapping.
- **Spring clutch** drive eliminates slippage and wear . . . provides smooth, quiet, positive operation.
- **Compactly built**—affords maximum visibility of tapping operation.
- Furnished to fit **any** Drill Press.

**One COMMANDER TAPPER handles the range #0 to ¾"**

*Write for circular and name of your nearest Distributor.*

**COMMANDER MFG. CO.**
4228½ W. Kinzie Street Chicago 24, Ill.

Product of *Commander* . . . Builder of the *Multi-Drill*

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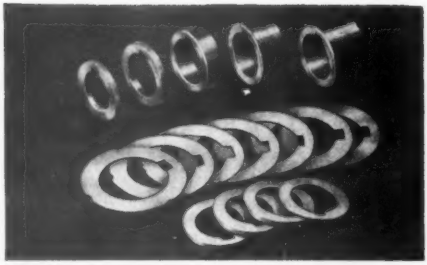
# *PACKAGED PRECISION*

MACHINISTS HAVE LEARNED TO RELY ON DE-STA-CO Arbor Spacers and Shims for milling, slitting, gang-saw set-ups and for shimming gears and bearings. De-Sta-Co long-life steel Spacers are packaged in a standard range of sizes from ⅜" to 4" hole diameter, up to 5½" outside, thicknesses from .001" to .125", all *with keyway.* Shims are stamped and coined to commercial tolerances in the same preferred sizes, *without keyway.*



Special spacers—thicknesses greater than .125"—are also available in popular sizes, machined from bar stock, hardened and ground, with standard keyways and thickness identifications.

Handy spacer kits of 19 graduated decimal thicknesses are stocked by Mill Supply Dealers in principal industrial centers. *Order your Packaged Precision Today.*

Your De-Sta-Co Toggle Clamp Catalog No. 47 is waiting for you. *Send for it!*

**DETROIT STAMPING COMPANY**
344 Midland Ave. Detroit 3, Mich.

# Again NEW, LOWER PRICES FOR LEMPCO ANTI-FRICTION DIE SETS

This third recent major price reduction is a prompt reflection of lower manufacturing costs.

Your enthusiastic acceptance of Lempco Anti-Friction Die Sets has allowed us to step-up production schedules and add more time-saving machine tools. We've been able to cut costs on our latest model—and, in the American tradition, pass our savings along to you.

The new Lempco *Precision* Die Set gives you all the advantages of anti-friction construction: increased die life . . . faster, more accurate production . . . greater economy.

Write today for your new price list and specifications for Lempco *Precision* and *Super-Precision* Anti-Friction Die Sets. At their new, lower prices, Lempco Precision Anti-Friction Die Sets are more than ever the best value your dollar can buy.

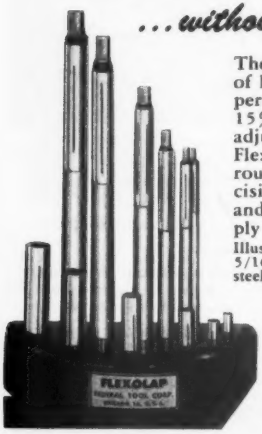
Licensed under the inventions of Guy Connor.

*Preloaded anti-friction bearings between leader pins and bushings hold punches and dies in perfect alignment. And, they allow sets to open and close freely and easily . . . save assembly and try-out time . . . cut costly downtime.*

**LEMPCO** 5713 DUNHAM ROAD • BEDFORD, OHIO

# *Flexolap*... INSTANTLY AND ACCURATELY ADJUSTABLE FOR FAST CUTTING AND POLISHING

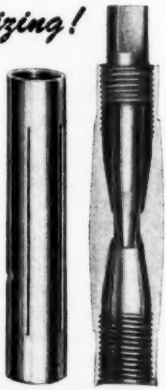
## *. . . without danger of galling or seizing!*




The Flexolap barrel is made with a series of longitudinal slots milled "off-center" to permit sensitively flexible expansion up to 15% — or more — under pressure of the adjusting pin. This construction enables Flexolap to save valuable time and to lap rounder, straighter holes. For accurate precision take-up, as desired, to maintain size and compensate for wear on barrel . . . simply turn adjustment screw.

Illustrated at left is Set No. 1. Six sizes (3/16", 1/4", 5/16", 3/8", 7/16" and 1/2") with six brass and six steel barrels on wood stand, complete..... **$12.75**

Also available in sizes 7/32", 9/32", 11/32", 13/32", 15/32", 9/16", 5/8", 11/16" and 3/4". For lapping holes smaller than 3/16", use the *Midget Lap*. Fourteen sizes: .032, .036, .040, .046, .054, .070, .079, .090, .104, .120, .135, .155, .170. Trial assortment (14 laps).... **$1.50**



*Write today for complete particulars*

**FEDERAL TOOL CORP., 3601 PRATT BLVD., CHICAGO 45, U.S.A.**

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# LET . . . . DETROIT POWER SCREWDRIVERS PAY YOU PROFITS

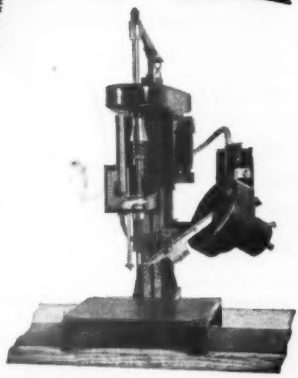
## IN TIME AND LABOR SAVED

Yes, substantial profits through reduced costs and increased production. That's what you gain by using these popular, highly efficient machines—proven through years of constant use.

**MODEL A PICTURED**
**Drives screws from No. 2 x 1/8 to No. 6 x 3/4.**

A real production machine; drives screws at the rate of one second each. Will not mar screw heads or strip threads. TWO OTHER MODELS, driving screws from No. 6 to 5/8.

Send Sample Assemblies for Estimates and Free Catalog.



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*Acme Offers Complete Facilities for All Types of*

# PRECISION GRINDING

*FAST SERVICE . . . EXPERT WORKMANSHIP . . . LOW COST*

- INTERNAL
- EXTERNAL
- CRUSH FORM
- CENTERLESS
- TWIN DISC
- SURFACE
- THREAD

Acme is equipped to handle all types of precision grinding. Expert craftsmen, using newest methods and modern equipment, will do the job for you faster, better, more economically. Acme also offers a flat lapping service that can finish surfaces to within millionths. Write for details.

**Acme Industrial Company**

*Makers of Standardized Jig & Fixture Bushings*

206 N. LAFLIN ST. • CHICAGO 7, ILLINOIS

THE SERVICE SHOP TO INDUSTRY FOR MORE THAN 25 YEARS




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## Severance MIDGET MILLS

HIGH SPEED—CARBIDE—GROUND-from-the-Solid

¼" SHANKS

**25 SHAPES H.S.**

**10 LEADERS**

from more than 20 SHAPES with several sizes of each shape.

a truly REVOLUTIONARY Cutting Tool

Obtain the best from the originator of GROUND-from-the-Solid

WRITE FOR CATALOG NO 16

GROUND FROM THE SOLID

**JUNIOR MILLS** High Speed—Carbide

⅛" SHANK

1½" LONG

Practical for use on small grinders for finishing Patterns, Dies, Parts, etc., in places difficult to reach with the larger Mills.

SET OF 10

**LAB MILLS** High Speed

⅛" SHANK 1¼" LONG

GROUND-from-the-Solid

These speedy Mills for Dental Laboratories find many uses in Jewelry and in Die and Mold making. Available in 7 popular shapes of 4 or more sizes, each for the finest cutting and finishing. May be reground up to 8 times per 1/32" reduction in diameter.

ACTUAL SIZE

COMPLETE REGRINDING SERVICE • BY NEW TOOL CRAFTSMEN • SAVES YOU MONEY

SEVERANCE TOOL INDUSTRIES INC.
730 IOWA STREET
SAGINAW, • MICHIGAN

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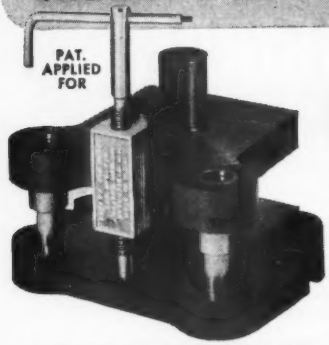
## DIE SETS SEPARATED AND ASSEMBLED QUICKLY...EASILY...SAFELY...WITH THE NEW

# PERSSON DIE JACKS




Eliminate old-fashioned, unsafe prying or hammering methods in your shop. Just clamp on punch holder and turn handle. Punch holder is raised or lowered smoothly - always under control. Die Jacks are made from fine steel and alloys. They are precision built tools every tool maker will want for his tool box or bench drawer.

NO PRYING OR HAMMERING —EASY DOES IT EVERYTIME!

**A few good territories still open for representation. Write for details and literature.**

T. G. PERSSON MFG. CO., 224 GLENWOOD AVE., BLOOMFIELD 4, N. J.

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# SHOP AIDS

## For You And Your Job

*Circle postage-free Inform-a-Gram Key Number for your requests.*

**A NEW ELECTRODE AND PREHEAT CHART** has been published by Ampco Metal, Inc., recommending arc welding electrodes for joining like or dissimilar metals. Thirty-one alloys are listed, and the best suited of 5 bronze electrodes for a particular welding application is shown—together with proper preheat for each joining application. The listed metals include copper, copper-base and iron-base alloys. Electrodes include Ampco-Trode 10, Ampco-Trode 160, Phos-Trode, Sil-Trode and Beryl-Trode. The chart (Bulletin W-19) is available at no cost by writing AMPCO METAL, INC., Dept. 956, 1745 S. 38th St., Milwaukee 4, Wis., or circle **Inform-A-Gram Key No. C36.**

**A NEW TIMESAVER TABLE** makes it possible to determine at a glance the number of parts that may be made from a given amount of material. This unique table is produced by West Coast Aero Tool Company, Los Angeles, and is invaluable in speeding up machine shop operations. To use the table it is necessary only to know the length of the part and the width of the cut-off blade to be used. The chart is available, in either notebook size or as a 22"x16" wall chart, by writing WEST COAST AERO TOOL CO., Dept. 65, 5401 Fountain Ave., Los Angeles 27, Calif., or circle **Inform-A-Gram Key No. C37.**

**STRESS-STRAIN RECORDERS AND STRAIN FOLLOWERS** are the subject of a new bulletin (No. 262) issued by The Baldwin Locomotive Works. The basic principles of the various types of Baldwin recorders are explained and illustrated with pictures and diagrams. Twenty-four different recorders for all common makes of testing machines are described; also 50 extensometers, compressometers and deflectometers that can be used with the recorders. Bulletin No. 262 is available by writing BALDWIN LOCOMOTIVE WORKS, Dept. 131, Philadelphia 42, Pa., or circle **Inform-A-Gram Key No. C38.**

**"MEEHANITE DESIGN DATA"** is the title of Bulletin 27 published by Meehanite Metal Corporation, New Rochelle, New York. The bulletin contains design data formulas and charts for computing maximum stresses in angles, ribbed plates, and shear-resistant webs containing cut-outs. This 19-page informative booklet is supplemented with a second bulletin (also No. 27) which gives typical examples of applications of the data with specific references to the charts and formulas. This 2-section bulletin is available free by writing MEEHANITE METAL CORP., Dept. 388, Pershing Square Bldg., New Rochelle, N. Y., or circle **Inform-A-Gram Key No. C39.**

**A NEW FILM ON CUTTER BIT GRINDING** has been released by the South Bend Lathe Works entitled "Grinding and Use of Basic Lathe Tool Cutter Bits". It is a 16 mm color sound film and is loaned to interested persons free of charge—or may be bought outright. Each step in grinding various types of cutting tools and each type of cutting tool in proper use and alignment are shown in detail and described. Thread cutting is shown step-by-

step. Manufacturers, tool and die shops, and engineering firms will find it invaluable in the instruction of apprentice machinists and lathe operators. Complete information on securing this film is available by writing SOUTH BEND LATHE WORKS, 391 E. Madison St., South Bend 22, Ind., or circle **Inform-A-Gram Key No. C35.**

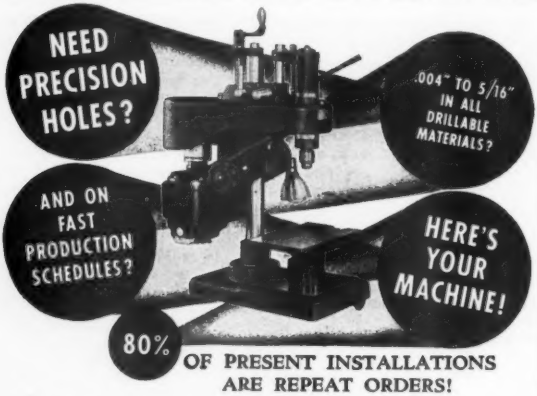
**"PROCESS ENGINEERING"**, by William H. Schutt, is primarily to train the reader who is familiar with time and motion study and can read blueprints, to become a process engineer. Process engineering is that phase of industrial engineering which determines the means, methods, and procedure of manufacturing an

article economically. It determines the best sequence of operations, the tools and fixtures to be used and their cost, and the type and cost of the machinery and equipment. Mr. Schutt's book covers this entire procedure in a clear easy-to-understand manner. Sample cost charts and numerous technical drawings illustrate each step. The book is priced at $4.00 and is available at THE McGRAW-HILL BOOK CO., Dept. 56, 330 West 42nd St., New York 18, N. Y.

**"AUTOMATIC BALANCING OF GRINDING WHEELS"** is a newly published bulletin which describes in detail a new method developed by Cincinnati Grinders, Inc. The new method is a combination of the Cincinnati Filmatic spindle bearing, and a new ingenious mechanism. The result is an automatic balancing of grinding wheels within a few seconds. Photographs and clarifying drawings and diagrams make the bulletin an interesting, informative aid to manufacturers. Send for your copy to CINCINNATI GRINDERS, INC., Dept. 8, Cincinnati 9, Ohio, or circle **Inform-A-Gram Key No. C32.**

**"BETTER GRINDING"** is the title of a new ring-bound leatherette grinding guide book published by Landis Tool Company. Operators of all grinding machines will find the statements and rules (with illustrations) contained in this book of great benefit for better, more efficient, precision grinding. The last few pages are devoted to Landis' many different grinders which are described and illustrated. "Better Grinding" is available from LANDIS TOOL CO., Dept. 355, 28 E. Sixth St., Waynesboro, Pa., or circle **Inform-A-Gram Key No. C40.**

**THE AMERICAN SOCIETY FOR TESTING MATERIALS** has published a booklet listing


OF PRESENT INSTALLATIONS ARE REPEAT ORDERS!

Precision manufacturers who have "tried out" the Hamilton Varimatic, Super Sensitive, Variable Speed Drilling Machine have found it so efficient in the drilling of small, precision holes on fast production schedules that 80% of our present installations represent repeat orders.

Investigate its many exclusive features. Our Bulletin V-47 gives complete information. Write for it today!

THE Hamilton TOOL COMPANY

SUPER SENSITIVE DRILLING MACHINES · TAPPING MACHINES · PORTELVATORS

832 SO. NINTH STREET · HAMILTON · OHIO · U · S · A


**A NEW 88-PAGE PRESS BRAKE DIE MANUAL** has just been published by Verson Allsteel Press Company, Chicago. Entitled "Verson Die Manual, A Handbook of Press Brake Dies, Punching Attachments and Press Brakes", the manual illustrates and describes over 200 press brake dies — ranging from simple bending dies to complex gang punching units. Related die types are grouped together with descriptive text which discusses their uses and advantages and limitations. Useful engineering data for making metal forming calculations and complete details and specifications on Verson Press Brakes are included. There is also detailed information on simplifying tooling and helping to avoid the dangers of misapplication of dies. Interesting photographs show the entire manufacturing process of Verson machines, stage by stage, with descriptive copy accompanying them. The handsomely bound manual is available without charge by writing VERSON ALLSTEEL PRESS CO., 9335 S. Kenwood Ave., Chicago 9, Ill., or circle **Inform-A-Gram Key No. C42.**



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technical data on materials. This handy pocket-size booklet contains a short synopsis of each book, a description of the size, number of pages, issuing data, and price. The work of the American Society for Testing Materials is of widespread interest and benefit to industry and government departments, and this booklet, which lists all their work, should prove helpful to all those interested in ASTM specifications, tests, proceedings, and symposiums. Send for your copy to AMERICAN SOCIETY FOR TESTING MATERIALS, Dept. 3, 1916 Race St., Philadelphia 3, Pa., or circle **Inform-A-Gram Key No. C33.**

**AN ENGINEERING MANUAL** has been released by Crane Packing Company, Chicago, containing tabulations of compound specifications and dimensional standards. Entitled "John Crane Hydraulic 'O' Rings", the manual has valuable data on applications, installations, etc., plus drawings showing typical problems of "O" ring usage. Send for your copy to CRANE PACKING CO., Dept. 53, 1800 Cuyler Ave., Chicago 13, Ill., or circle **Inform-A-Gram Key No. C34.**

**"DESIGN OF MACHINE ELEMENTS"**, by M. F. Spotts, Associate Professor of Machine Design, The Technical Institute, Northwestern University, explains the fundamental principles required for the correct design of separate elements which compose the machine. Illustrations, diagrams, charts and tables bring out the important designing information contained in the book. A brief review of strength of materials, basic theories of design are clearly presented, and many newer methods now being employed. Priced at $6.65, it is available from PRENTICE-HALL, INC., Publishers, Dept. 842, 70 Fifth Ave., New York 11, N. Y.

**"COMMON SENSE IN STEEL TREATING"**, a new book by W. R. Bennett, relates factual experience gained through the author's fifty years of practice and study. Mr. Bennett has presented the material for the purpose of solving the difficulties constantly cropping up in the process of hardening steel. The book does not offer a preponderance of subjects with no direct bearing on present difficulties, but deals with specific problems causing trouble. It points out the dangerous steps and advises methods to eliminate them entirely. The price of the book is $2.00 and is available from W. R. BENNETT, Dept. 83, 66 Green St., Brattleboro, Vermont.

**A NEW DECIMAL-FRACTION CALCULATOR** has been developed by the Wendt-Sonis Company, Hannibal, Missouri. The calculator is designed for use in adding and subtracting fractions and converting fractions to decimals or vice versa. It is available at no cost by writing to WENDT-SONIS CO., Dept. 518 Hannibal, Mo., or by circling our postage-free **Inform-A-Gram Key No. C41.**

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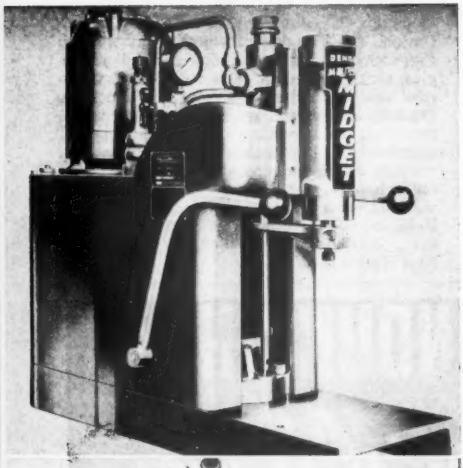
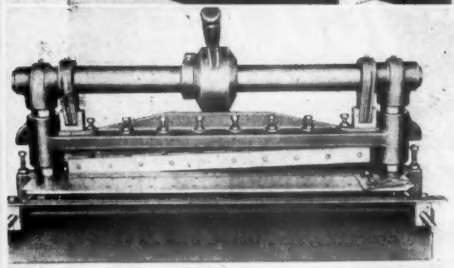
SEE ADVERTISERS INDEX, PAGE 71, FOR KEY NUMBERS

# PROGRESS

NEW DEVELOPMENTS • IMPROVEMENTS • COST AND TIME SAVERS



**CIRCLE KEY NUMBERS ON POSTAGE-FREE INFORM-A-GRAM INSERT FOR FURTHER INFORMATION**

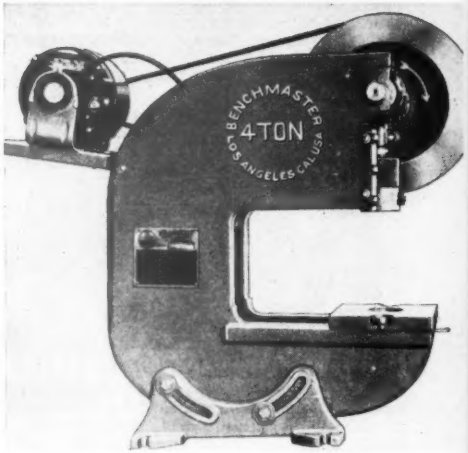
**MULTIPRESS IN NEW PACKAGED UNIT,** known as the Midget, is announced by The Denison Engineering Company. This is a low-cost, complete unit, offering all the increased-production and cost-cutting features of a much larger machine. It is a multi-purpose, oil-hydraulic press of 2000 lb. capacity, complete with its own pumping equipment. Ram stroke, ram speed and ram pressure are all regulated by fingertip controls. The ram stroke is 6" and ram speed 600 ipm up and 400 ipm down. Tooling can be changed easily so that, combined with its light weight, the machine can be moved from job to job around the shop. The automatic pressure assures perfect production even with an unskilled operator. For further details write THE DENISON ENGINEERING CO., Dept. 260, 1197 Dublin Rd., Columbus 16, Ohio, or circle **Inform-A-Gram Key No. A40.**

**THE DI-ACRO SHEAR** is a versatile "Die-Less Duplicating" unit which will accurately and rapidly shear a wide variety of materials to extremely close tolerances. O'Neil-Irwin, the manufacturer, introduced this new machine recently to fill the need of a precision shear with a greater width. This Di-Acro shear No. 4 has a 24" capacity. This precision shear is able to cut the lightest of tissues as well as its maximum capacity of 16 gauge steel. In all the materials it performs a clean cut free from rough edges or burrs. The Di-Acro No. 4 is especially adaptable to model, research and experimental work. Details available from O'NEIL-IRWIN MFG. CO., 315 8th Ave., Lake City, Minn., or circle **Inform-A-Gram Key No. A41.**

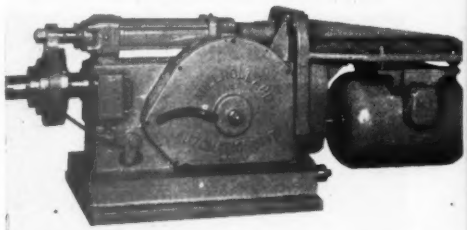
**300° F TO 2000° F TEMPERATURE RANGE** is possible in the new Cooley Model VK-6 electric box furnace manufactured by Cooley Electric Mfg. Corp. Model VK-6 has an 8" by 6" by 14" chamber and is particularly applicable to tool and die work, production treating of small parts, running pilot lots, emergency repairs, and testing. An interesting new feature is the vertical lift door with exterior mechanism and counterweights. This furnace is equipped with the Cooley "Selective Power Modifier" which provides highly accurate temperature regulation over the entire range down to 300° F. Rapid and uniform heating is assured by six embedded-type heating elements. Further details from COOLEY ELECTRIC MFG. CORP., Dept. 587, 32 S. Shelby St., Indianapolis, Ind., or circle **Inform-A-Gram Key No. A42.**

# ON PARADE

**THE NEW BENCHMASTER DEEP THROAT PUNCH PRESS** is of 4 ton capacity. The throat depth is such that it can punch to the center of a 17½" circle, making the press particularly valuable for sheet metal work as well as all jobs requiring deep horizontal space. Power is supplied with a ⅓ hp motor. The press may be used either with or without the 6" by 8" by 1" bolster plate. The new Benchmaster press is supplied with choice of 1" or 1¼" stroke, although strokes up to 2" may be obtained on special order. The ram position is adjustable and dovetails are gibbed for takeup if wear occurs. All bearings are bronze bushed. Benchmaster's positive, single-trip safety mechanism is employed to engage the flywheel. The press is available either as a bench or pedestal model with inclinable frame positioning. Sturdy cast iron legs are available as a standard extra. Literature and further details are available by writing BENCHMASTER MFG. CO., Dept. 169, 2952 W. Pico Blvd., Los Angeles 6, Calif., or circle **Inform-A-Gram Key No. A43.**



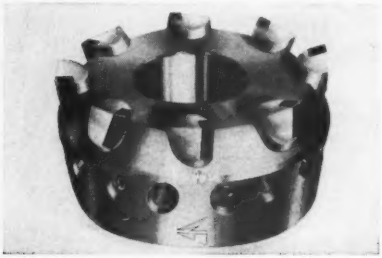

**MILLHOLLAND AUTOMATIC UNIT NO. 5** has been completely redesigned. Some of the new features include new design of pneumatic counterbalance, improved feed clutch, heavier spindle construction, increased support for spindle, liberal use of anti-friction bearings. This unit is completely self contained and individually motor driven; thus it is especially well adapted for the concern desiring to build its own production machinery. It is easily changed over from one production job to another. The automatic cycle keeps tools actually producing 80% to 85% of working time. Full details and engineering data available from W. K. MILLHOLLAND MACHINERY CO., Dept. 57, 1048 Fairfield Ave., Indianapolis 5, Ind., or circle **Inform-A-Gram Key No. A44.**



**BROWN & SHARPE'S NEW POLISHING AND FINISHING MACHINE** is extremely advantageous for general all around use where polishing, filing, burring, and similar operations are required on small parts. The convenient height permits the operator to either sit or stand at his work. Three spindle speeds —4500, 3280 and 2380 rpm—are provided, driven by V-belt from a ½ hp motor. Simultaneous opening of the collet and stopping of the spindle are provided by foot pedals which control the collet and brake. This leaves the operator's hands free to load. The outside of the work spindle is threaded to take a small chuck or other fixture that may be required. Further details from BROWN & SHARPE MFG. CO., Dept. 73, 235 Promenade St., Providence 1, R. I., or circle **Inform-A-Gram Key No. A45.**

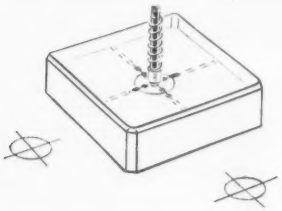
## PROGRESS ON PARADE

**NEWLY DESIGNED INSERTED TOOTH CUTTERS** are announced by the Wendt-Sonis Company, Hannibal, Mo., which may be employed as either left-hand or right-hand cutters. Equipped with right-hand cutting blades as standard, the same cutter body can be used as a left-hand cutter by inserting a set of left-hand style blades. The blade holding fixture is designed for fast and simple blade setting.



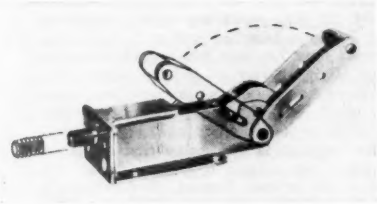
Each style has the type of mounting best suited for safety in operation and accuracy in machining. Further details from WENDT-SONIS CO., Dept. A-3, Hannibal, Mo., or circle **Inform-A-Gram Key No. A38.**

**VIS-U-LINE CENTER PUNCH** is an accurate center punch incorporating an entirely new design. The manufacturer, Unico, Huntington, New York, has inserted a 1" hardsteel punch at right angles to the work in a transparent plastic block, 2" by 2" by ½". The block is clearly marked with broken, double cross-lines for easy alignment. A tap on the punch marks the true center of the cross-lines; the



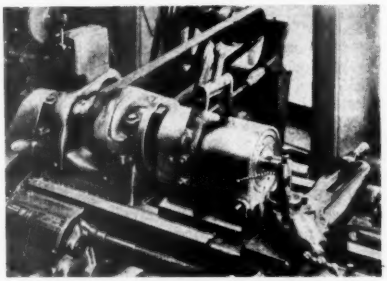
punch then returns to its original position. Further details are available from UNICO, Dept. 81, Huntington, New York, or circle **Inform-A-Gram Key No. A37.**

**THE PUSH AND PULL CLAMP** is a new type of clamp designed by Lapeer Manufacturing Company for applications not satisfied by toggle clamps. It can perform in places where space is limited, or where the plunger must travel under load, either pushing or pulling. This model P & P-800 can exert up to 800 pounds pressure with normal hand operation and will lock and hold work securely upon completion of the handle swing. The clamp can be mounted on the bottom or front at any angle that will allow full swing of the handle. It is suitable for milling machines,



drilling machines, cut-off saws, etc. Further details may be obtained by writing LAPEER MFG. CO., Dept. 649, Lapeer, Mich., or circle **Inform-A-Gram Key No. A32.**

**MODEL "B", A NEW TYPE OF COLLET SPEED CHUCK,** rotates on its own bearings. Developed by Zagar Tool, Inc., it derives its turning power from the spindle of the machine to which it is attached. By elimination of overhang, heavier work can be done than usual. The Model "B" uses Zagar's standard principle of having the collet remain stationary while opening and closing, thereby allowing accurate length dimensions on parts be-



ing machined. The working mechanism of the collet closing device is located between the two precision ball bearings. The chucks are available in 1" and 2" through capacities. Further details may be had by writing ZAGAR TOOL, INC., Dept. 650, 23880 Lakeland Blvd., Cleveland 17, Ohio, or circle **Inform-A-Gram Key No. A35.**

## *As Every Machinist Knows*
## IT PAYS to REDUCE TAP BREAKAGE

The DAHLSTROM TAP GUIDE does the job in a fraction of the time required for hand tapping. Because the work is dependably straight and square, tap breakage is practically eliminated—and gone are the hours wasted in prying broken taps out of dies. Equipped with seven adaptors, ranging from 5/32 to 1/2", it takes care of ordinary requirements. Taps not furnished. Dahlstrom Manufacturing Co., 422 South Sixth St., Minneapolis 15, Minn. *$52.50 F.O.B. Minneapolis.* Circular on request.

*Dahlstrom* TAP GUIDE

- 12" x 6" x 14"
- Fastens to wall or bench
- Anyone can operate it

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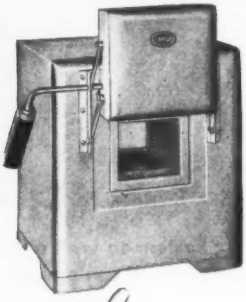
SEE ADVERTISERS INDEX, PAGE 71, FOR KEY NUMBERS

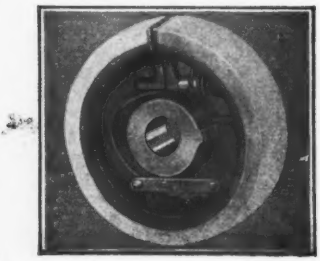
# PROGRESS ON PARADE

**A NEW LINE OF TEMCO ELECTRIC FURNACES** has been introduced by Thermo Electric Manufacturing Company for laboratory uses and heat treating of carbon and high chrome steel parts and tools. Known as series 1500, 1600, and 1700, there are six sizes, ranging in chamber dimensions from 4" wide by 3½" high by 4½" deep, to 8½" wide by 7½" high by 18" deep. The furnaces are fast heating and may be operated up to 1650° F continuously, and 1900° F for short

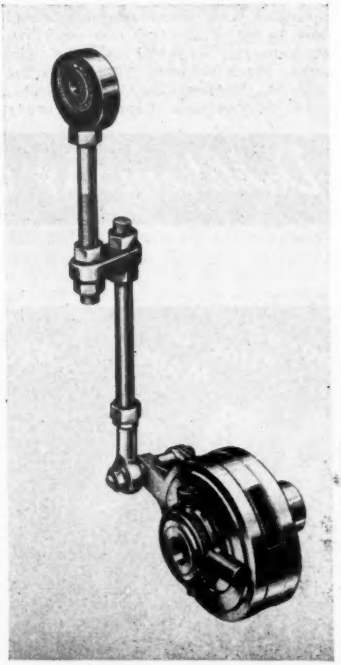


periods. Heavy gauge highest quality nickel-chromium heating elements are embedded in the refractory plates which form the sides, top and bottom of the chamber. Construction data on these long-wearing furnaces and detailed information are available by writing THERMO ELECTRIC MFG. CO., Dept. 488, 474-9 W. Locust St., Dubuque, Iowa, or circle **Inform-A-Gram Key No. A33.**

**A SAFETY ABRASIVE WHEEL** has been developed by J. C. Manufacturing Company, New York, to prevent accidents that occur when a sanding wheel opens or breaks in operation. The all-metal frame has an outside diameter of 5" or 6", 1½" wide abrasive, and a 100% wool felt cushion. The perfectly balanced wheel is free from vibration and has a simple rotary locking mechanism for replacing the abrasive cloth. It is guaranteed not to open while in motion. Further details from J. C. MFG. CO., Dept. 80, 259 Seventh Ave., New York 1, N. Y., or circle **Inform-A-Gram Key No. A36.**



**THE SELECT-O-MATIC UNIVERSAL POWER PRESS FEED UNIT** is an adjustable universal ratchet feed unit. It is designed by Carl G. Peterson Company, Providence, R. I., to provide intermittent and unvarying movement of coil stock materials, brass, steel, etc., through metal stamping machines and punch presses. It is a totally enclosed unit, consisting of a two hundred ten tooth ratchet wheel with an aluminum housing containing thirty-two pawls.



Only one pawl engages the ratchet at any given moment. The purpose of so many pawls is to divide the angular increments between each tooth into 32 equal divisions. Therefore, with a 2 inch feed, the lineal dimension will be less than .001". These units may be attached to most general types of punch presses. For further details and prices, write EARL ELWYN SMITH, Dept. TDJ, P. O. Box #53, West Hartford 7, Conn., or circle **Inform-A-Gram Key No. A39.**

# HAND SPRING WINDER

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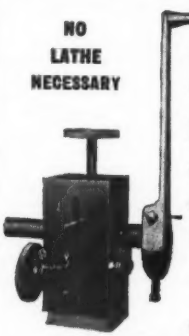

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5. Wire capacity up to .229" diameter
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FIREBOX
7¾" high
13 " wide
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For low cost heat treating high speed steels, dies, tools. Reaches operating temperatures FAST. Saves time and gas. Counterbalanced door opens upward. Complete with Carbofrax Hearth, G.E. Motor and Johnson Blower.

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6-Burner for 1800-2400° F.....$325.00

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575 E Ave. N. W., Cedar Rapids, Iowa

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Address _____
City _____ Zone ____ State _____

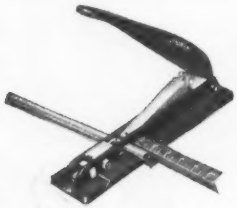



SEE ADVERTISERS INDEX, PAGE 71, FOR KEY NUMBERS

## PROGRESS ON PARADE

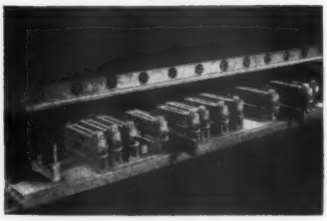
**TWO HANDY NEW TOOLS,** developed by Gardner Wire Company, Chicago, provide efficient means of making small special looped or hooked extension springs quickly

and easily. The HOOK-KON spring looping tool, shown in photograph above, is a hand tool for forming perfect loops—center single or double loops and half-loop hooks, or side loops or hooks—on the ends of coiled wire springs. Shown in photograph below is Gardner's No. 1-S spring cutter—a precision-built tool designed to cut off measured lengths of coiled wire springs or wire easily, quickly and without overstressing or distorting spring ends. The cutter is of "knife blade" design and will pass between adjacent coils and cut off even a very small spring without bending

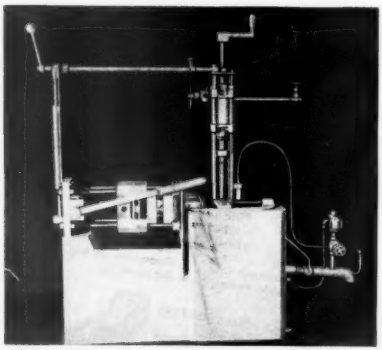


or distortion. The cuts being made with a direct thrust makes possible accurate controlling of the length. A built-in six inch scale facilitates accuracy. Each of these tools is available alone or in handy kits which include springs. Literature and further details are available by writing GARDNER WIRE CO., Dept. TDJ, 5045 W. Lake St., Chicago 44, Ill., or circle **Inform-A-Gram Key No. A34.**

**A NEW, PATENTED, "STRIP" TEMPLATE METHOD,** for mounting Wales Hole Punching and Notching Units in press brakes, has been announced by the Wales-Strippit Corp. Faster setups, reduced press "down time" and easier, less expensive storage of patterns, are genuine advantages available to users of this unique method. The "Strip" templates fit into a T-slot designed into a special Wales Press Brake Rail. This rail remains in the press brake when setups are changed. Dowel or pilot holes are drilled and reamed in the "Strip" templates at the center of the location of holes to be punched. These holes in the template are used as guides for the pilot pins which are located at the bottom and on the center line of punches and dies incorporated in the Wales self-contained units. Setups are made outside the press and are placed in the press brake rail, then bolted to the T-slot. After a pattern has been run, the same group of Wales Hole Punching and Notching Units may be reused in other "Strip" template setups. WALES-STRIPPIT CORP., Dept. 60, 355 Payne Ave., N. Tonawanda, N. Y. **Inform-A-Gram Key No. A64.**



**A SMALL SEMI-AIR DIE CASTING MACHINE** has been added to the well-known line of production die casting machines manufactured by the H. L. Harvill Mfg. Co. Known as Model AHH-1, this machine is a small production model with injection of the metal accomplished by air pressure through an immersed injection piston assembly, popularly



known as the "hot chamber" method. Zinc, lead, and tin base alloys are cast through a center gate. Dies are opened and closed by hand, as is ejection of the castings after solidification. Safety-interlock features make it impossible to inject or "shoot" the molten metal into the die cavities unless and until the dies are locked in their closed position, giving full protection to the operator against spraying molten metal. Standard die blocks are available with the machine. H. L. HARVILL MFG. CO., Dept. 5, P. O. Box 177, Corona, Calif., or circle **Inform-A-Gram Key No. A9.**

## Predictable Castings Produced for Machining

It's surprising to learn how many manufacturers are looking for sound, accurate, predictable ferrous castings Everywhere we go to talk about *Strenes Metal* cast dies, we are asked if we do the same quality of work in alloy gray iron and gray iron When we answer yes, we are given a lot of jobs for machine beds, bases, columns, and other items which require good castings, and our customers keep coming back for more.

As everyone knows, it pays to go far, if necessary, to get close-grained castings free of porosity, cold shuts, blowholes, inclusions, and other defects revealed by machining. The extra transportation cost is insignificant compared to the reduction of tooling expense and avoidance of scrap.

If you have been unsuccessful in getting predictable castings for machining, communicate with us.

*Write, phone, or wire.*

**THE ADVANCE FOUNDRY COMPANY** Dayton 3, Ohio

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STRENES METAL
ALLOY GRAY IRON
GRAY IRON

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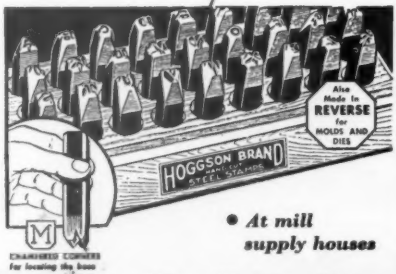
## Steel Stamps

**Letters and Figures**

**Deep, hand-cut letters in special-formula steel—result of 90 years of die making—assure clean impressions and long service. Face of stamp is angled for extra strength. Ideal for parts and tool marking and numbering. Also made in reverse for marking molds and dies.**




• *At mill supply houses*

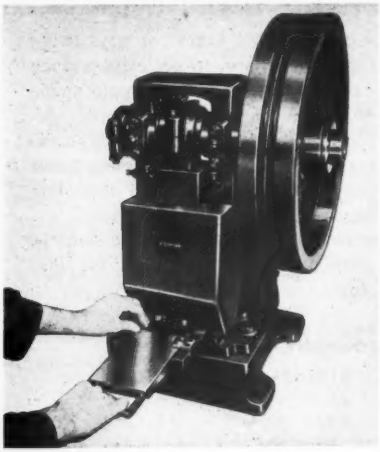
**HOGGSON & PETTIS MFG. CO. • New Haven, Conn.**




SEE ADVERTISERS INDEX, PAGE 71, FOR KEY NUMBERS

# PROGRESS ON PARADE

**A NEW 10 TON NAME PLATE STAMPING PRESS** was announced recently by Acromark Co., Elizabeth, New Jersey. The press combines consecutive serial numbering with stamping voltages, model numbers, revolutions per minute, size, and other data. This is

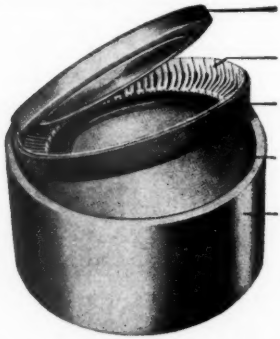


all done in one operation. In operation, as the slide is pulled out after each stroke, a name plate is dropped into position and an inward slide movement pushes it into stamping position, at the same time dropping the previously stamped name plate down a chute at the back of the press. The slide feed is operated by hand, but may be constructed for automatic mechanical operation at each press stroke. ACROMARK CO., Dept. 636, 5-15 Morrell St., Elizabeth 4, N. J. **Inform-A-Gram Key No. A59.**

**NEW LONGITUDINAL DUPLEX MICROMETER,** manufactured by Richards Machine Tool

Company, is designed for inside work—to take both inside and outside measurements of grooves and flanges on the inside of a bore. Small enough to reach into a hole or opening down to ½", the measurements are readable while the instrument is held in place, thus preventing any possibility of error. Graduations are clear cut, and measuring pins are hardened and ground on a radius for accuracy and to prevent cramping. For further details write RICHARDS MACHINE TOOL CO., Dept. 26, 124 S. Isabel St., Glendale 5, Calif., or circle **Inform-A-Gram Key No. A97.**

**STRIP EXPANDERS FOR LEATHER CUP PACKINGS,** manufactured by the HPL Manufacturing Company, are made of a specially heat-treated beryllium copper strip material that is highly impervious to corrosion from brine solution, gasoline, alcohol, sea water and many other solutions. This Strip Expander for air-hydraulic fluid sealing, is designed to maintain constant contact between packing seal lip and cylinder wall on all pneumatic and hydraulic equipment. It does not increase

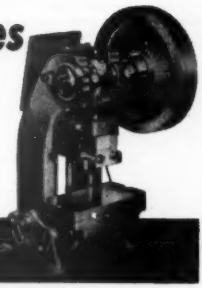


friction or wear on the packings, as the expander merely exerts enough pressure to maintain constant contact between the packing and cylinder wall. In all cases, the pressure inside the cylinder creates a far greater friction between the packing and cylinder wall. For the installation it is merely necessary to cut off a suitable length of the expander and insert this expander between the clamping plate and the packing seal to get the required pressure on the packing lip. Designed to fit any cup diameter 2" or over, this HPL Strip Expander is carried in stock in numerous sizes by the manufacturer. The HPL Manufacturing Company is also equipped to furnish finger cup expanders for leather cups 2" and less. HPL MFG. CO., Dept. 1, 2013 E. 65th St., Cleveland 3, Ohio. **Inform-A-Gram Key No. A25.**

# DIAMOND Punch Presses

**9 TON BENCH MODELS TO 56 TON**

**GEARED PRESSES**



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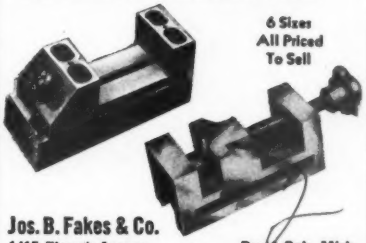

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Precision Steel and Brass Collets for South Bend Lathes or other makes of lathes or machines that they will fit.

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|---|---|---|---|---|---|
| Max. Cap. In. | | 1/2 | 11/16 | 3/4 | 1 |
| Thread Dia. In. | | .850 | .855 | .950 | 1.250 |
| Thread Lgth. In. | | 3/4 | 13/16 | 13/16 | 3/4 |
| Threads Per In. | | 28 | 20 | 20 | 20 |
| Body Dia. In. | | .8495 | .8595 | .9495 | 1.2495 |
| Collet Lgth. In. | | 2-11/16 | 3-5/16 | 3 | 3-9/32 |
| Head Dia. In. | | .952 | 1.085 | 1.150 | 1.452 |
| Head Taper Deg. | | 12 | 15 | 10 | 10 |
| Prices Postpaid | Steel | $3.75 | $4.00 | $4.25 | $4.75 |
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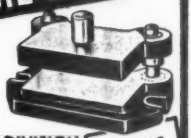
**DANNEMAN** *Precision* **DIE-SETS**



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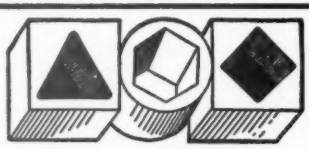

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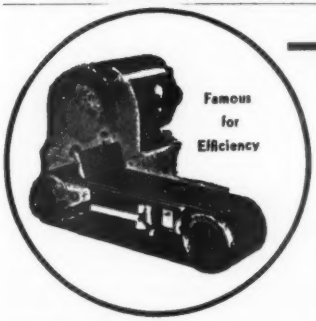


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This new, streamlined bench type grinder assures fast, quality finishing on metals, plastics, wood, fibre . . . at low cost. Built to machine tool specifications, Standard D-4 is equipped with improved band tension control and specially designed protective motor hood. 4x36¼" band. The ideal portable unit!

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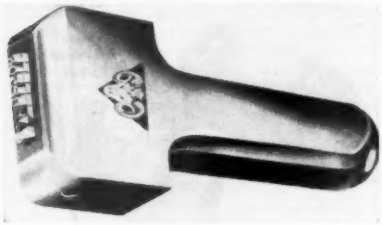
# PROGRESS ON PARADE

**FOR THE SAFE AND EASY HANDLING OF RIGID SHEETS** of plastics, laminates and other non-porous materials, Industrial Products Co., Philadelphia, offers a new safety vacuum lifter. The lifter weighs only 4½ ozs. and is a 15" handle with a vacuum cup at the end.

The vacuum grip can be released by finger pressure on a lever in the handle. A "must" in press room equipment, this lifter is ideal for feeding, lifting, handling and positioning in stamping machines or draw and forming presses. INDUSTRIAL PRODUCTS CO., Dept. 36, 2803 N. Fourth St., Philadelphia 33, Pa. **Inform-A-Gram Key No. A84.**

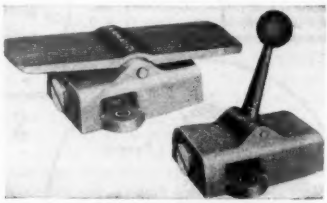
**SOCKET WRENCH RATCHETING ATTACHMENT** converts any ½" drive socket wrench handle into a ratcheting device. This "Ratchetor", manufactured by the Plomb Tool Co., Los Angeles, has a ½" square plug with ball-check for holding a socket wrench, a ½" square opening for insertion of a handle, and a reversible ratcheting mechanism. This simple, positive-acting device is sturdily built for high torque strength—yet compact for ample clearance. Although intended mainly for use with a hinge handle, speed handle or torque wrench—it may be used also with other non-ratcheting handles. PLOMB TOOL CO., Dept. 921, 2209 Santa Fe Ave., Los Angeles 54, Calif. **Inform-A-Gram Key No. A81.**

**A HANDY STEEL STAMP HOLDER** for marking parts for which it is impractical to stock a quantity of different stamps is in production now at Acme Marking Equipment Co., Detroit. Ideal for short production runs and model changes, the holder pictured below is for hand use, but it is also available with press shank



for machine operation. Several characters can be marked at once with uniform spacing and alignment. The type inserts are easily inserted and removed by simply loosening and tightening a set screw. The stamp comes in a complete kit with either figures, letters, or both, in type sizes from $\frac{1}{16}$" to $\frac{3}{16}$" high. ACME MARKING EQUIPMENT CO., Dept. 61, 8030 Lyndon Ave., Detroit, Mich. **Inform-A-Gram Key No. A75.**

**LOW-COST HAND- AND FOOT-CONTROLLED VALVES,** non-corrosive, have been developed by the Airmatic Valve, Inc., Cleveland. Both valves, Models H.F-3 (3-way) and H.F-4 (4-way) have precision machined in-



ternal parts and are designed for locking or non-locking with neutral. They are of modern, rugged and compact design—adaptable for the positive, accurate control of small single-acting and double-acting cylinders on continuous-operated machines. AIRMATIC VALVE, INC., Dept. 55, 1643 East 40th St., Cleveland, Ohio. **Inform-A-Gram Key No. A76.**

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***is now made better than ever with M-2 high speed steel***

This modern post-war steel means even *more* cutting . . . even *faster* cutting . . . for this outstanding blade which has been replacing all-hard blades with mechanics everywhere.

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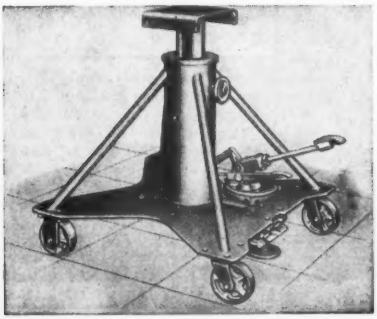
SEE ADVERTISERS INDEX, PAGE 71, FOR KEY NUMBERS

## PROGRESS ON PARADE

**PORTABLE, MOTORIZED REPAIR SHOP,** for "on the spot" repairs on any job, is announced by Wyzenbeek & Staff, Inc. This "Handy-Matic", 32" high, is of strong steel

construction and mounted on three caster legs. Three speeds, 1400, 2400, 4500 rpm, are provided by the ⅓ hp motor. The cabinet is conveniently equipped with shelves, and the tools and accessories which come with it allow for "on-the-job" sanding, drilling, wire brushing, grinding, carving, and many other operations. The price and further information may be had from WYZENBEEK & STAFF, INC., Dept. 533, 838 W. Hubbard St., Chicago 22, Ill., or circle **Inform-A-Gram Key No. A83.**

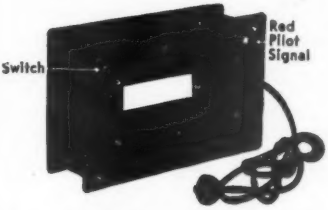
**HYDRAULIC TABLE WITHOUT TOP,** manufactured by Lyon-Raymond Corporation, is for special applications requiring an adjustable pedestal capable of handling 2,000 lb loads. An 8"x10" bracket is furnished for mounting special tools and fixtures. The platform elevates from 28" to 44" and can be locked in one position or allowed to revolve freely. It is mounted on casters and easily moved about —or a floor lock will hold the table firmly in position. A hydraulic cylinder and single speed hydraulic foot pump with a pedal release provide the elevation. For more details write LYON-RAYMOND CORP., Dept. 374, 3774 Madison Ave., Greene, N. Y. **Inform-A-Gram Key No. A24.**



**NEW GUSHER COOLANT PUMP,** Model 11029, manufactured by The Ruthman Machinery Company, has several new features.

The pump motor is equipped with new style upper end bell, having a large built-in conduit box with ample capacity to accommodate the multiple lead wire of dual voltage stators. The thru bolts fasten from inside the upper end bell. Large precision sealed prelubricated ball bearings are used, eliminating the need for oilers or grease fittings. All rotating parts are dynamically balanced by an electronic process, thus insuring quiet operation and long life. There are no metal-to-metal contacts within the submerged portion. Write THE RUTHMAN MACHINERY CO., Dept. 318, 1809 Reading Rd., Cincinnati 2, Ohio, or circle **Inform-A-Gram Key No. A99.**

# *Save* TOOLS · TIME · LABOR
## *with the Improved* · AMC · DEMAGNETIZER




No shop or toolroom can afford to be without one. Thoroughness of the AMC Demagnetiser will give greater precision to finished parts.

One pass through AMC Demagnetiser removes all magnetism from processed parts. Large flat surfaces are demagnetised by sliding unit over surface.

● Our AMC Demagnetiser will pay for itself in a few weeks. Standard units available.

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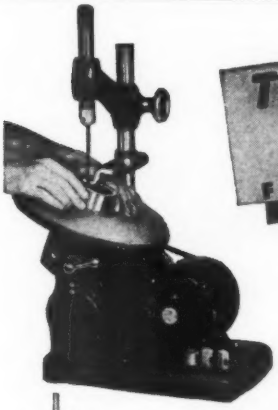

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FILES . . . SAWS . . . STONES

**ILLINOIS DIE FILING MACHINE**

An accurate, smoothly-operating machine that files, saws and stones the most intricate die shapes . . . eliminates tedious hand operations . . . reduces costs. It is quality-built for long, trouble-free service . . . hardened and ground shafts running in bronze bushings minimize wear. The holding chuck and clamping device provide perfect file alignment.

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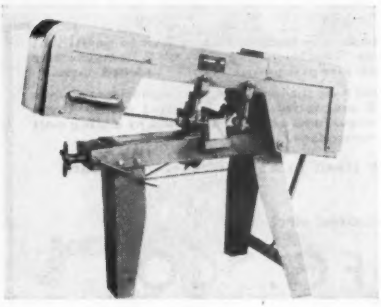
MANUFACTURERS OF METAL CUTTING TOOLS AND SHAKEPROOF PRODUCTS




SEE ADVERTISERS INDEX, PAGE 71, FOR KEY NUMBERS

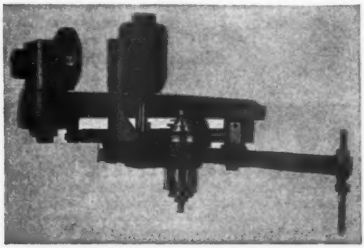
# PROGRESS ON PARADE

**A SMALL LOW-COST HORIZONTAL BAND SAW** of sturdy construction has been designed to cut off metals up to a capacity of 5"x10" by Johnson Manufacturing Co., New York City. The rigid box-type frame has wheel assemblies mounted high on welded steel brackets bolted high on the frame. An improved hydraulic system is built into the machine to give correct feed for every section, and a stock stop gauge is supplied for duplicate



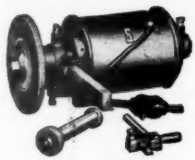
cutting. The machine is simply designed so that even an inexperienced operator can run it. It operates and shuts off automatically. All the controls are within easy reach of the operator, and wheels are fully guarded. JOHNSON MFG. CORP., Dept. 648, 405 Lexington Ave., New York 17, N. Y. **Inform-A-Gram Key No. A79.**

**"MULTI-GRAVER" ATTACHMENT FOR MILLING MACHINES** makes it possible to perform two- and three-dimensional profiling and contour milling, as well as engraving, on any milling machine. This "Control-Cut Multi-Graver" is manufactured by the Auto Engraver Co., New York City. It is particularly adaptable to reproducing dies for die casting or stamping, and for reproducing molds. It is easily and simply operated by following the contour of the master template



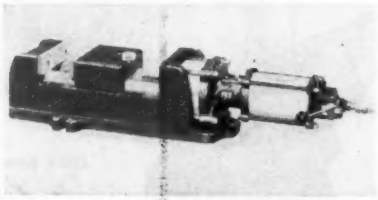
with stylus arm controlled by the operator. A great saving is effected with this attachment in that all the operations can be performed on one machine. AUTO ENGRAVER CO., Dept. 196, 1776 Broadway, New York, N. Y. **Inform-A-Gram Key No. A74.**

**A REDESIGNED ¼ HP TOOL POST GRINDER** is announced by The Standard Electrical Tool Co., Cincinnati. The grinder features a light-weight motor housing of aluminum. Its easy portability makes the grinder particularly suitable for grinding of lathe centers, cutters, reamers, dies, rolls and various work on lathe, milling machine, etc.



Precision ball bearings are fully protected, oil lubricated with convenient oil cups. Illustrated with the grinder are two available accessories—a tooth rest and internal grinding attachment. THE STANDARD ELECTRICAL TOOL CO., Dept. 470, Mt. Hope & Sixth Sts., Cincinnati 4, Ohio. **Inform-A-Gram Key No. A78.**

**AN AIR-HYDRAULIC VISE** has been added to The Bellows Company's well known line of "Controlled-Air-Power" devices. The vise



uses flexible, controlled air pressure as a clamping force and develops a clamping pressure of 150 times the operating air line pressure from any air line pressure up to a maximum of 125 lbs. The opening of the hardened steel jaws is adjustable from a fraction of an inch up to 5 inches, in additions of $\frac{1}{32}$", through a positive locking adjustment nut on the hydraulic ram. Supporting the hardened steel jaws are soft steel false jaws. Bellows Model BM-10 Air Motor supplies the power in combination with a special built-in hydraulic intensifier unit. THE BELLOWS CO., Dept. 839, 222 West Market St., Akron, Ohio. **Inform-A-Gram Key No. A86.**

## NEW ACRO SAFETY PARALLEL UNIT

A low price indispensable tool for all Tool and Die Departments—Machine Shops.

- SAFER
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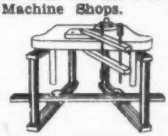
- 3", 5", 7", HEIGHTS
- HARDENED
- PRECISION GROUND



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**SURFACE PLATE** for laying out, etc. Precision ground to .001". 12" x 17" x 3", top 3/4" thick . . . **$37.50**

**ANGLE PLATE.** Precision ground. 3-1/4" x 3-1/4" x 4-1/4" . . **$20**

**V-BLOCKS** for holding cylindrical parts. Precision ground. 1-15/16" x 2-15/16" x 2-1/4" Cap. 1/4" to 2" Round Per matched pair . **$32**

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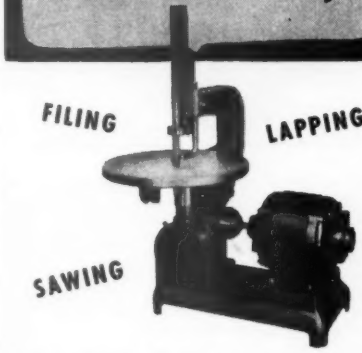
# FOR LIGHT OR HEAVY *Die Making*




## OLIVER BENCH MODEL

The Oliver Die Making Machine is adaptable to light or heavy sawing and filing operations on tool steels up to 1" thick. It stands up—many units have been in continuous use for more than 25 years, cutting direct labor costs from 50% to 60% in many cases.

A Heavy Duty model is available for work on steels up to 3" thick.

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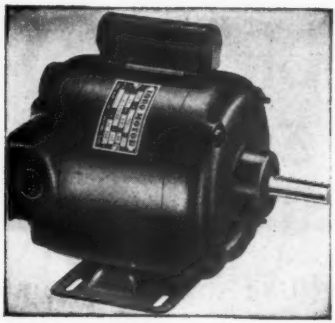
IMPROVE YOUR TOOLROOM IT'S THE BACKBONE OF PRODUCTION

OLIVER OF ADRIAN

**TRIPLE SEAL WINDINGS,** having high torque starting characteristics, are a feature of the new line of type CSI capacitor start, fractional horsepower motors announced by the Torq Electric Manufacturing Corporation. The



rotor is of all welded, pure copper bar construction. The motors are of splashproof design, have sturdy steel frames and die cast aluminum alloy end bells with cast-in terminal for easy wiring. Frame ratings of ⅛, ¼, ⅓, and ½ hp, single phase, 60 cycle, 115-230 volt, can be supplied, with heavy duty precision sleeve bearings or ball bearings. The motors are particularly adaptable to such applications as conveyors, stokers, pumps, compressors, etc. For more information write TORQ ELECTRIC MFG. CORP., Dept. 45, 1085 Interstate St., Bedford, Ohio, or circle **Inform-A-Gram Key No. A11.**

**MULTILIFT MODEL S MAGNETIC SEPARATOR,** an adjustable hand magnet of the permanent (non-electric) type, has been intro-

duced by the Multifinish Manufacturing Company. It is completely self-powered and, operated with one hand, it can lift up to 15 pounds. A finger-tip lever releases its load. Two 4-inch Alnico magnets are enclosed in the moisture-proof aluminum and stainless steel case which will not lose their power regardless of length of use. This Multilift Model S has proved invaluable in handling nuts, bolts, screws, nails and small parts; separating stacked steel strips; removing heat-treated parts from carbon, handling hot or cold parts; separating steel from non-ferrous materials of many kinds such as brass, chemicals, foods, fibres; and in salvaging steel parts or particles from aisles, assembly lines, etc. The machine weighs 3¾ pounds. For further details write MULTIFINISH MFG. CO., Dept. 220, 2114 Monroe Ave., Detroit 7, Mich. **Inform-A-Gram Key No. A30.**

**A SOLID CARBIDE CENTER-LAPPING TOOL** is now in production by Raymac Manufacturing Company, Inc. Standard sizes include

½ x 1½ and ⅜ x 1½—60 degrees included angle, and special sizes are manufactured as required. This tool may be reconditioned from 25 to 50 times with no change in quality of operation, and may be used in standard center-lapping machines or drill presses. Designed to replace abrasives, the tool assures faster and cheaper production. It is precision ground by hand and not machine indexed. Write to RAYMAC MFG. CO., INC., Dept. 45, 3729 Cass Ave., Detroit 1, Mich., or circle **Inform-A-Gram Key No. A4.**

## CUT BORING COSTS

Boring
C'Boring
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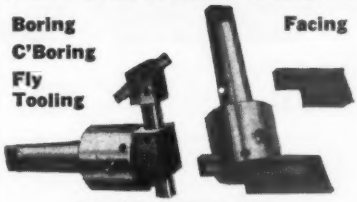
Tooling

Facing



**Blind Hole Bottoming**

Many enthusiastic users report that the Behr Boring Bar actually pays for itself in the first four weeks of operation. Just ask the man who uses one.

This new patented bar is chatter proof, extremely accurate and ultra efficient. Has interchangeable blades and accessories.

It is unequaled for versatility and efficiency.

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Recondition broken taps—sharpen dull taps, from #7 to 2½". Fits any cutter grinder. Mail Coupon TODAY for illustrated bulletin.

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Rotary spinning principle shapes uniform heads, silently . . . capacities up to 3/8 inches diameters. Adjustable spindle stroke, controlled pressure . . . double row radial thrust bearing supports spindle, assures long life. Table elevating screw prevents slipping. Six floor or space-saving bench models . . . sturdily built for trouble-free operation under severe production schedules.

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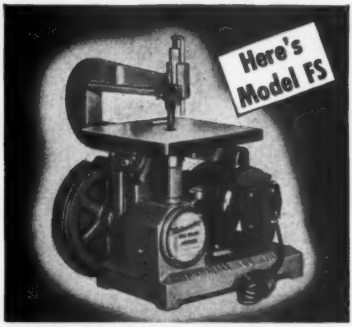


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**with the NEW All-Purpose Deep-Throated OVERARM**

Performs *All Three* Die-Making Operations efficiently, at 40 to 60% saving.

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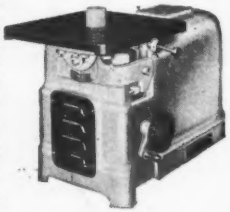

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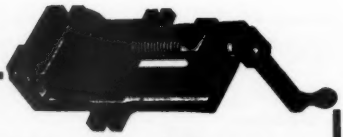

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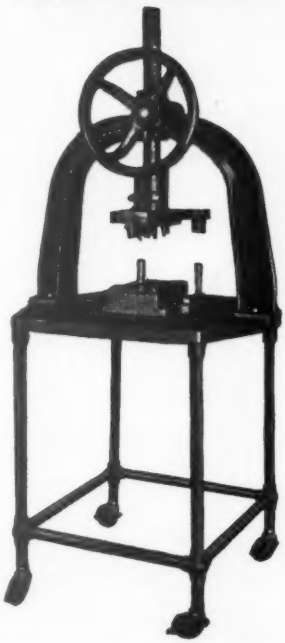

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Here is a truly "one man" press that operates with one hand and under full manual and visual control.

Handy for tool and press rooms, it permits the diemaker to complete a die-set *right at his bench* . . saves tool room and handling costs.

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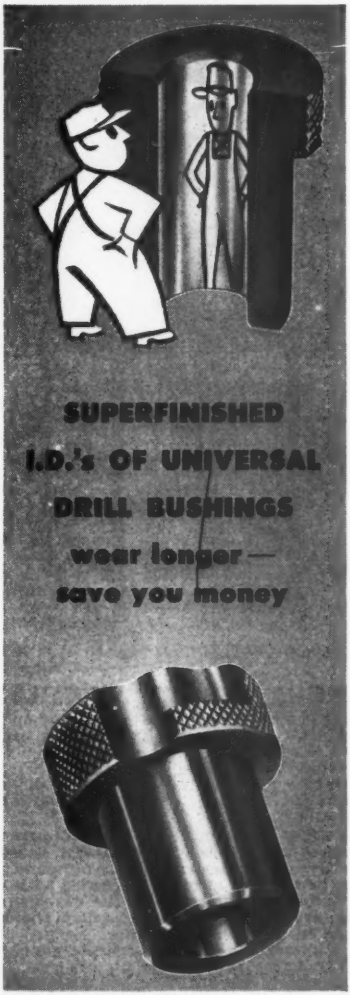

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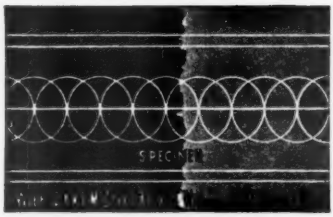

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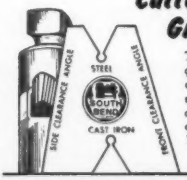
$24.50
Case Extra $3.50

***Cutter Bit Grinding Gauge***




This gauge eliminates guesswork when grinding cutter bits. Every necessary angle including rake can be checked. Made of stainless steel. Size 1-7/8" x 2" x 1/16".

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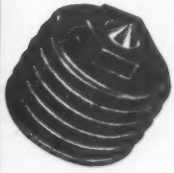

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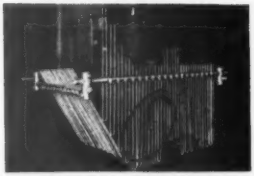

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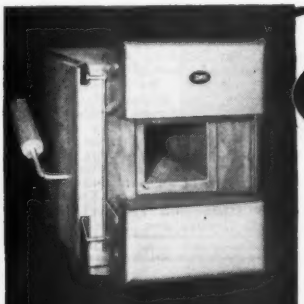

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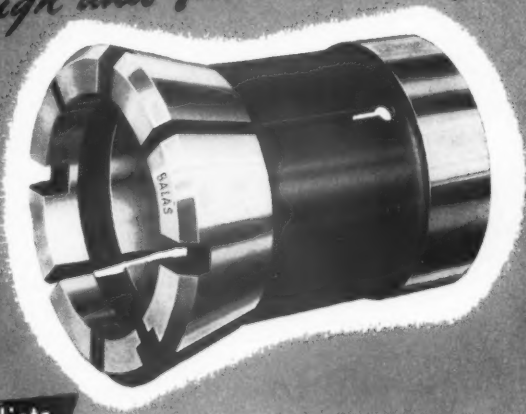


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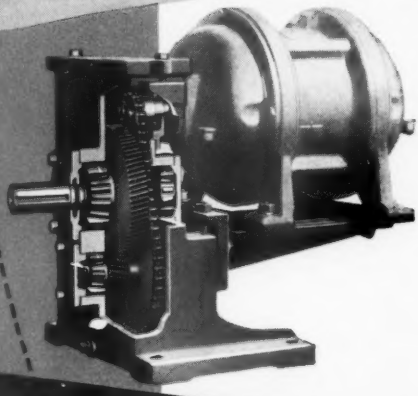

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